Hazmat Guide

- General Incident Approach
- Chemical Pages
- Tank & Rail Car Silhouettes
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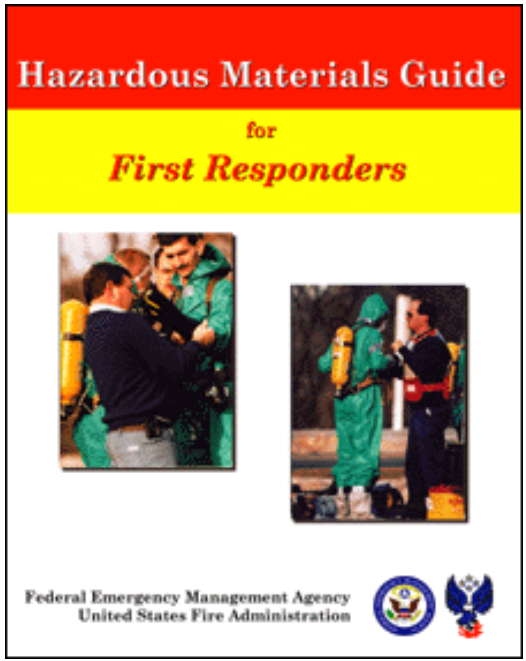
Hazardous Materials Emergency Preparedness Grant Program & Curriculum

USFA Hazardous Materials Guide for First Responders



About This Guide

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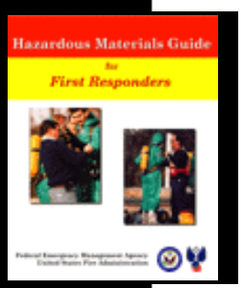

USFA Hazardous Materials Guide for First Responders
General Approach to a Hazmat Incident

Hazardous materials incidents are different from fire suppression or other usual emergency operations. The nature of the hazard requires different protective equipment, operational approaches, skills and attitudes. The rules are changed. Getting in and making a fast attack is not the order of the day. A slower methodical approach is called for, as well as the need to follow federal and state law.

Last Updated: September 8, 1998

individual chemical sheets are contained on the pages below in alphabetical order.

[Aa-Al] [Am-Az] [Ba-Be] [Bf-Br] [Bs-Bz]

[Ca-Ch] [Ci-Cz] [D] [E] [F-G] [H-I] [J-K-L]

[M] [N] [O-P] [Q-R-S] [T] [U-V-W-X-Y-Z]

Last Updated: April 7, 1999

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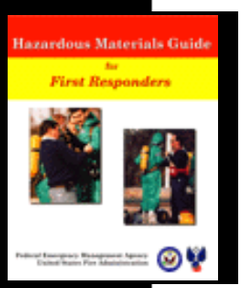

USFA Hazardous Materials Guide for First Responders
Silhouettes of Rail Cars, Tank Trucks and Chemical Tanks

Last Updated: November 3, 1998

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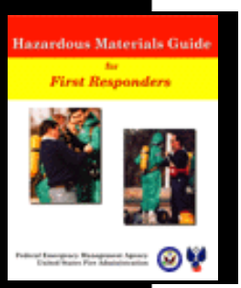

USFA Hazardous Materials Guide for First Responders
Glossary Terms and Abbreviations

Acid
A chemical which neutralizes alkalies forming salts. Acids have low pH's.

Acute
Having a rapid onset and progression.

Aerosol
Particles dispersed in a gas (usually air). Examples are fog (liquid particles) and smoke (solid particles).

Alkali
A chemical which neutralizes acids forming salts. Alkalis have high pH's. Alkalis are corrosive.

Anhydrous
Containing no water.

asym
An abbreviation for asymmetrical - referring to a particular arrangement of elements within a chemical molecule.

Asphyxiation
Injury or death caused by the replacement of oxygen in the environment by another gas or vapor.

Awareness Level Trained
First responders at the awareness level are those persons who, in the course of their normal duties may be the first on the scene of an emergency involving hazardous materials. First responders at the awareness level are expected to recognize hazardous materials presence, protect themselves, call for trained personnel, and secure the area. (NFPA 472)

Basic Life Support (CPR)
First aid measures done to assist a victim's breathing and heart action such as cardiopulmonary resuscitation.

BLEVE
An acronym for Boiling Liquid Expanding Vapor Explosion. Materials which BLEVE may cause storage containers and parts of containers to rocket great distances, in many directions. Any liquid may cause a BLEVE.

Boil
To change from a liquid state to a gaseous state.

Cameo
Acronym for Computer Aided Management of Emergency Operations developed by the National Oceanic and Atmospheric Administration.

CAS Identification Number
A number assigned to each unique chemical entity by the Chemical Abstract Service of the American Chemical Society.

Catalyst
A substance which, when present in a very small amount, increases the rate at which two or more chemicals react together.

Chemical Protective Clothing
Items such as clothing, hood, boots and gloves (fully-encapsulating suit) made from chemical-resistant materials that are designed and configured to protect the wearer from hazardous materials.

CHEMTREC
The CHEMical TRansportation Emergency Center, a public service of the Chemical Manufacturers Association. Located in Washington D.C. Available 24 hours a day. (1-800-424-9300)

CHRIS
An acronym for the Chemical Hazard Response Information System. Written and maintained by the United States Coast Guard.

Chronic
Occurring over a long time - many days or longer.

cis
refers to a particular arrangement of elements with a chemical molecule.

Combustion
The process of burning.

Compressed Gas
A gas which exerts a pressure of at least 41 psi in the container in which it is stored.

Concentration
The amount of one substance mixed or dissolved in a specified amount of a second substance.

Confined Space

A space that has limited openings for entry and exit and has poor natural ventilation.

Confinement

Actions taken to keep a material in a defined or local area after it is released.

Container

Anything that holds material, including storage tanks, pipelines and packaging (drums, carboys, etc).

Contaminated

Containing potentially harmful material.

Contamination

A release of hazardous material from its source to people, animals, the environment or equipment.

Corrosive

Any material which causes visible damage or irreversible alteration of human tissue (skin, eyes, etc.) at the site of contact or causes metals or plastics to corrode at a rapid rate.

CPR

Acronym for CardioPulmonary Resuscitation an emergency procedure used to maintain and restore breathing and blood circulation.

Cryogenic

A material at a very low temperature.

Decompose

Breaking apart into smaller different chemicals.

Decontamination

The removal of a hazardous material from a victim or equipment.

Decontamination Area

Area located on the upwind edge of the Hot Zone used to decontaminate personnel and equipment. All personnel coming out of the Hot Zone must pass through the Decontamination Area for decontamination.

Deforming

Changing shape.

Deluge

A flooding quantity of water.

Detonate

The rapid decomposition of an explosive material leading to a rapidly moving wave of high temperature and high pressure. May be started by impact, friction or heat.

Dike

Barrier constructed to hold back a spill or leak.

Disperse

To scatter in different directions.

DOT

An acronym for United States Department of Transportation.

Explode

The rapid expansion of a material or container with the release of energy, heat or pressure.

Explosive

Any substance designed to produce an explosion (i.e. an extremely rapid release of gas and heat) or capable of producing an explosion by reacting with itself.

FEC

An acronym for Facility Emergency Coordinator.

FEMA

An acronym for United States Federal Emergency Management Agency.

Fire Fighting Gear

Turnout gear including footwear, trousers, a coat, gloves, a helmet, and respiratory protection. (NFPA 472)

First Responder

The individual who arrives first at the scene of a Hazmat incident with the responsibility to act.

Flammability

Flammable

In this volume, defined as the equivalent of NFPA Flammability Hazard Class 1.

Very Flammable

In this volume, defined as the equivalent of NFPA Flammability Hazard Class 2.

Highly Flammable

In this volume, defined as the equivalent of NFPA Flammability Hazard Class 3.

Extremely Flammable

In this volume, defined as the equivalent of NFPA Flammability Hazard Class 4.

Flashpoint

The lowest temperature at which the vapor of a substance will catch on fire. It will not continue to burn without the addition of more heat. The flashpoint is lower than the ignition temperature.

Fog
Liquid particles dispersed in air.

Freeze
To change from a liquid state to a solid state.

Frostbite
Injury caused to skin or other tissue by very cold materials. The medical consequences are similar to those caused by burns.

Fumes
A general term for vapors, gases, or smoke.

Gas
A state of matter in which the material can expand and contract in response to pressure or temperature.

Hazard
A potential risk or danger.

Hazardous Material
Any substance capable of causing harm to people, animals, property or the environment.

Hazmat Incident
Actual or potential unplanned release of a hazardous material.

HAZWOPER
Name given to the 29CFR 1910.120 regulation entitled Hazardous Waste OPeration and Emergency Response.

HVAC
An acronym for Heating, Ventilating, and Air Conditioning systems.

Hot Zone
The area immediately around the incident site. Appropriate protective clothing and equipment *must* be worn by all personnel in the Hot Zone. Awareness Level and Operational Level trained personnel are not permitted in the Hot Zone.

ICS
An acronym for Incident Command System.

Ignition Temperature
The minimum temperature to which a material must be raised before it will burn. The ignition temperature is higher than the flashpoint.

Incident Commander (IC)
The individual responsible for the management and coordination of all incident operations.

Inhalation
Breathing a chemical into the lung.

Inhibited
Containing a small amount of another substance included to prevent the first material from reacting with itself or other things in its environment.

Insoluble
Not able to be dissolved.

Isomer
A material with the same chemical composition (i.e. kind and number of elements) as another material but with a different arrangement of those elements. For example, n-butyl alcohol and t-butyl alcohol are isomers of one another.

LEPC
An acronym for Local Emergency Planning Committee.

m-
An abbreviation for "meta". Referring to a particular arrangement of groups attached to a benzene molecule.

Methemoglobin
An abnormal form of hemoglobin which will not carry oxygen in the blood.

Monitor
A self supporting fire fighting nozzle which can function unattended and delivers a large volume of fire suppressant material.

MSDS
An acronym for Material Safety Data Sheet. Information provided by the manufacturer of a material about its physical and chemical properties as well as the hazards associated with its use.

n-
An abbreviation for "normal". It refers to the arrangement of carbon atoms in a chemical molecule.

N-
A symbol used in some chemical names indicating that the next section of the name refers to a chemical group attached to a nitrogen atom.

NA Identification Number
An acronym for North America. A four-digit number assigned to some chemicals found in transport in North America.

NFPA
An acronym for National Fire Protection Association, Inc.

NIOSH
An acronym for United States National Institute of Occupational Safety and Health.

Non-flammable
Not capable of being burned under normal conditions.

o-

An abbreviation for "ortho". Referring to a particular arrangement of elements within a chemical molecule.

Operations Level Trained

First responders at the operational level are those persons who respond to releases or potential releases of hazardous materials as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They shall be trained to respond in a defensive fashion to control the release from a safe distance and keep it from spreading. (ANSI/NFPA 472)

OSHA

An acronym for United States Occupational Safety and Health Administration.

Oxidizer

A chemical which when mixed with combustible or flammable material will start a fire or make an exisiting fire worse.

p-

An abbreviation for "para". Referring to a particular arrangement of elements within a chemical molecule.

Peroxide

Chemicals which contain two oxygen atoms bound together. Often explosive.

Placard

A sign or symbol designed to be hung on a wall, container or vehicle containing warning information to convey the level of hazard.

Pungent

Sharp or irritating.

Response

That portion of incident management in which personnel are involved in controlling a hazardous materials incident. (ANSI/NFPA 471)

Risk

A measure of the chances that damage to life, property, or the environment will occur if a hazard occurs. Risk includes consideration of the severity of the damage.

Runoff

Excess water produced during fire fighting or from rain.

SARA Title III

Superfund Amendments and Reauthorization Act of 1986. Title III of SARA, the Emergency Planning and Community Right-to-Know Act of 1986, includes detailed provisions for community planning.

SCBA

An acronym for Self Contained Breathing Apparatus. SCBA includes a seal tested mask, positive pressure regulator and a pressurized air supply.

sec-

An abbreviation for "secondary". Referring to a particular arrangement of elements within a chemical molecule.

Shelter in Place

Protect people without evacuating by keeping them inside a building with windows and doors closed and external ventilation systems shut off until a hazardous situation has resolved.

Solubility

The degree to which one material may be completely mixed with or dissolved in another material.

Stabilized

Containing a small amount of another substance included to keep the first material from changing form.

STCC Identification Numbers

An acronym for Standard Transportation Commodity Code. A seven digit identification number commonly used for materials shipped by rail. Numbers beginning with 49- are hazardous materials.

Sublime

To change from a solid state to a gaseous state without becoming a liquid.

sym-

An abbreviation for "symmetrical". Referring to a particular arrangement of elements within a chemical molecule.

t-

An abbreviation for "tertiary". Referring to a particular arrangement of elements within a chemical molecule.

tert-

An abbreviation for "tertiary". Referring to a particular arrangement of elements within a chemical molecule.

Thio-

Containing a sulfur atom.

Toxic

Capable of causing human injury. A poison.

trans-

Referring to a particular arrangement of elements within a chemical molecule.

UN Identification Number

An international four digit number assigned to all hazardous materials regulated

by the United Nations.

Volatile

Easily changes from a liquid to a vapor.

>

A symbol meaning "greater than".

<

A symbol meaning "less than".

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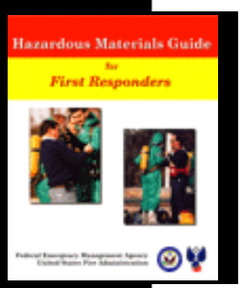

USFA Hazardous Materials Guide for First Responders
National and Regional Hazmat Resources

(Listed in alphabetical order, not in order of priority)

For State Hazardous Materials Offices, please see our State Contacts page.

Agency for Toxic Substances Disease Registry (ATSDR)

Contact Number: 404-639-0615
Hours of Operation: 24 hours/day
Services Provided: Will assemble an expert team of toxicologists and response experts to proved needed information. Will come on site if needed.

CHEM-TEL, INC.

Contact Number: 800-255-3924
Hours of Operation: 24 hours/day
Services Provided: Will provide information on products as provided in manufacturers MSDS.

CHEMTREC®

Contact Number: 800-424-9300, 703-527-3887
Hours of Operation: 24 hours/day
Services Provided: Will provide information on products as provided in manufacturers MSDS. Can assist in identifying and contacting manufacturer of product or shipment.

National Pesticide Telecommunications Network

Contact Number: 800-858-7378
Hours of Operation: 0930-1930 EST
Services Provided: Will provide information on pesticides.

National Response Center (U.S. Coast Guard)

Contact Number: 800-424-8802
Hours of Operation: 24 hours/day
Services Provided: Notification required by law for many releases. Can give information on all aspects of release management.

Rapid Response Information System

Hours of Operation: 24 hours/day
Services Provided: The Rapid Response Information System (RRIS) can be used as a reference guide, training aid, and an overall planning and training resource for response to a chemical, biological and/or nuclear terrorist incident. The RRIS is comprised of several databases, consisting of chemical and biological agents' and radiological materials' characteristics, first aid measures, Federal response capabilities, Help Line, Hotlines, and other Federal information sources concerning potential weapons of mass destruction.

Regional Poison Control Centers (state-wide resources)

Contact Number: See local phone book
Hours of Operation: 24 hours/day
Services Provided: Can provide information on the health risks associated with chemicals. May have information on other hazards and appropriate responses.

U.S. Department of Transportation Emergency Response Guidebook

Services Provided: The 2000 North American Emergency Response Guidebook (NAERG2000) was developed jointly by the US Department of Transportation (DOT), Transport Canada (TC), and the Secretariat of Communications and Transportation of Mexico (SCT) for use by firefighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving a hazardous material. It is primarily a guide to aid first responders in (1) quickly identifying the specific or generic classification of the material(s) involved in the incident, and (2) protecting themselves and the general public during this initial response phase of the incident. The NAERG2000 is updated every three years to accommodate new products and technology.

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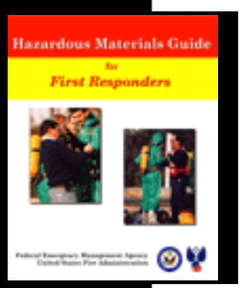
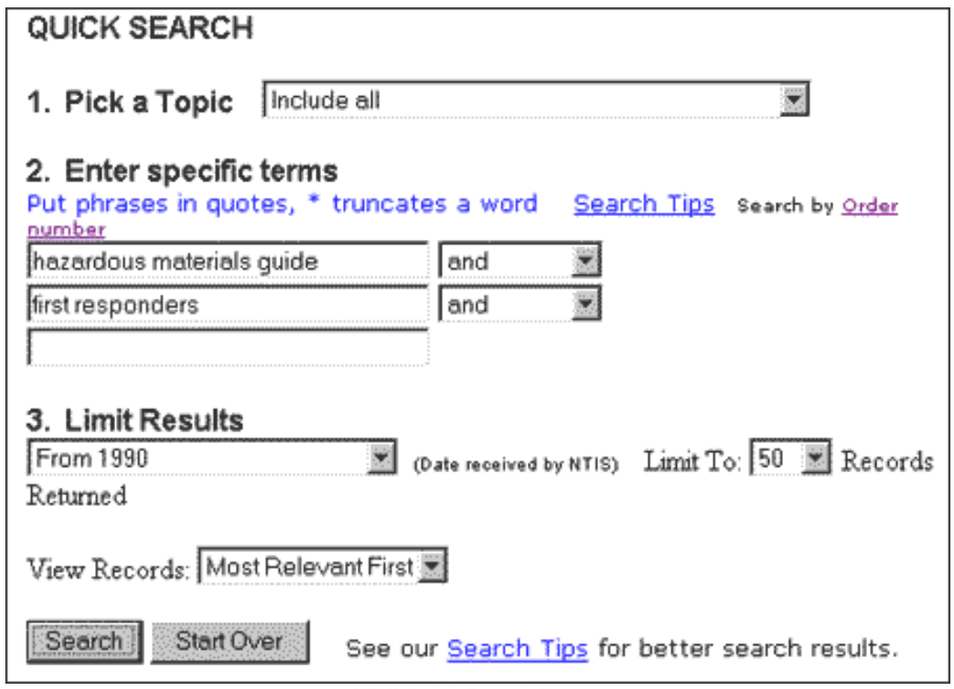


USFA Hazardous Materials Guide for First Responders
How to Order

The *Hazardous Materials Guide for First Responders* may be ordered from the United States Department of Commerce, National Technical Information Service (NTIS) by calling:

1-800-553-NTIS (6847) or
(703) 605-6000
Order number (Hardcopy): AVA-20342-BB00 ($70)
Order number (CD-ROM): AVA20831-CDRM ($60)

The guide may also be ordered from the **NTIS National Audiovisual Center's web site**. From the NTIS Quick Search Page, enter search criteria as shown below:



NTIS Quick Search Screen

A list of search results will be returned with a link to the *Hazardous Materials Guide for First Responders* at the top. Click on this link to order.

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Railroad Tank Car Marking System

DOT	111	A	60	AL	W	1
AUTHORIZING AGENCY Tank car specifications start with three letters designating the agency under whose authority the specification was issued • DOT - Department of Transportation • AAR - Association of American Railroads • ICC - Interstate Commerce Commission (Regulatory Authority Assumed by DOT in 1966) • CTC - Canadian Transport Commission	**CLASS DESIGNATION** The Three Digit Class Designation Follows the Authorizing Agency • Non-Pressure Tank Cars DOT-103 AAR-201A DOT-104 AAR203W DOT-111 AAR-206 DOT-115 AAR-211A • Pressure Tank Cars DOT-105 DOT-114 DOT-109 DOT-120A • Cryogenic Liquid Tank Cars DOT-113 AAR 204W AAR 204X (Inside Box Car) • Miscellaneous Tank Cars DOT-106A, DOT-110A Multi-Unit Tank Car Tanks DOT-107A High-Pressure Tank Car AAR-207 Pneumatically Unloaded Covered Hopper AAR-208 Wooden Tank Car	**SEPARATOR CHARACTER** Significant only for Class 105, 113, 114 Tank Cars and Some 111 Tank Cars When Retrofitted. "A" - Top and Bottom Shelf Couplers "S" - Tank Headshields, Top and Bottom Shelf Couplers "J" - Jacketed Thermal Protection, Tank Headshields, Top and Bottom Shelf Couplers "T" - Spray-On Thermal Protection, Tank Headshields, Top and Bottom Shelf Couplers	**TANK TEST PRESSURE (PSI)**	**TYPE OF MATERIAL USED IN TANK CONSTRUCTION** "No Letter" - Carbon Steel "AL" - Aluminum (Classes 103, 105, 109, & 111) "A-AL" - Aluminum Alloy "N" - Nickel "C", "D" or "E" - Stainless Steel (Alloy/Steel)	**TYPE OF WELD USED** "W" - Fusion Welding "F" - Forge Welding	**OTHER CAR FEATURES** Fittings, Materials, Linings

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Pressure Cars (Page 1)

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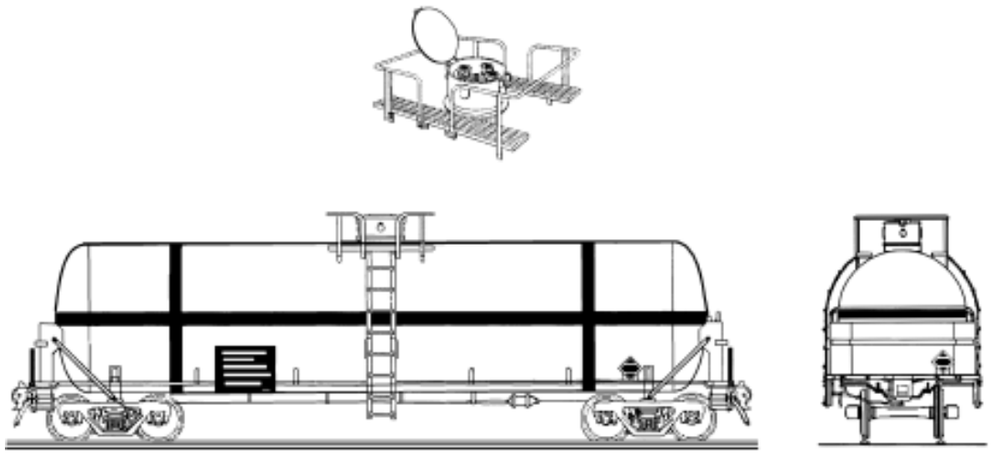
Pressure cars are used to transport hazardous materials under pressure or hazardous materials which the DOT or the shipper feel require the additional protection of a stronger car. The most common types of pressurized cars used in rail transportation are the DOT 105, 112 and 114. Drawings of 105's and 112's can be found in this Appendix. The DOT 114 is the same as the DOT 112 except that the 112 has bottom outlets and washouts. DOT Car Types 107 And 109 are also pressurized cars. DOT Types 106 and 110 pressurized, multi-unit tank cars are one-ton cylinders which can also be transported by highway. As a general rule, safety valves are set at a pressure to match vapor pressure of product at 105° F.

TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)
A-3 -- Class 105	
DOT 105J100W Thermal Protection. Head Protection. Safety Valve (75 psi).	Ethylene Oxide Liquefied Petroleum Gas Liquefied Hydrocarbon Gas
DOT 105J200W Thermal Protection. Head Protection. Safety Valve (150 psi).	Sulfur Dioxide Vinyl Chloride Liquefied Petroleum Gas
DOT 105J300W Thermal Protection. Head Protection. Safety Valves (225 psi).	Anhydrous Hydrofluoric Acid Anhydrous Ammonia Metallic Sodium Chlorine Liquefied Petroleum Gas Liquefied Hydrocarbon Gas Motor Fuel Anti-Knock Compound Vinyl Chloride
DOT 105J400W Thermal Protection. Head Protection. Safety Valves (300 psi).	Liquefied Petroleum Gas Liquefied Hydrocarbon Gas

DOT 105A500W - Hydrogen Cyanide (Hydrocyanic Acid), HCN "Candystripe Car"



B-END

Hydrogen Cyanide is shipped in specially built cars. Pictured is a 105A500W 20,500-gallon capacity. Other cars used are the 105A600W and the 105J600W. For safety purposes, the cars may be stenciled as 300W, but have the higher-pressure safety valves. These cars have a 1-1/8" thick inner shell, 4" of cork insulation and a 1/4" outer shell. **All HCN cars will be painted white with the red bands or "candystripes."**

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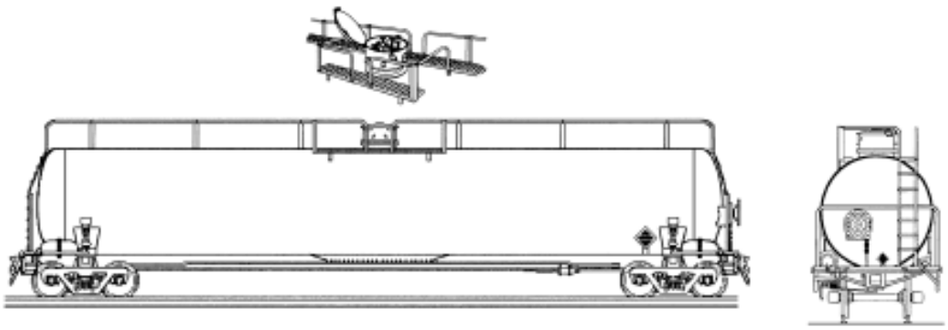
TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)

DOT 105A500W Insulated - Carbon Dioxide Service



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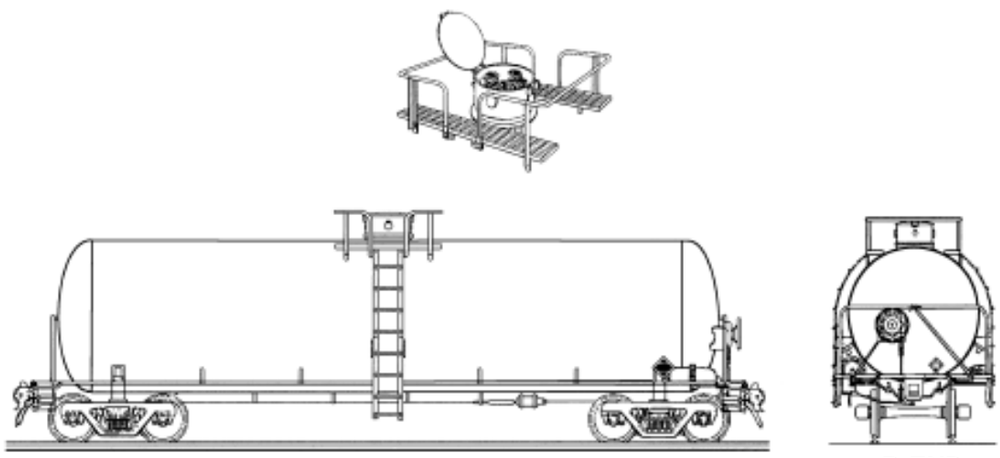
20,000 GALLON CAPACITY - INSULATED
DOT 105A500W
FOR CARBON DIOXIDE SERVICE
(PRE 1983)

DOT 105A500W Insulated - Chlorine Service



B-END

90 TON CAPACITY - INSULATED
DOT 105A500W
FOR CHLORINE SERVICE
(POST 1982)

Insulated. Safety Valve (375 psi) (350 psi on Carbon Dioxide Cars).	Chlorine Carbon Dioxide Anhydrous Hydrofluoric Acid

DOT 105J500W Thermal Protection. Head Protection. Safety Valve (375 psi).	Liquefied Petroleum Gas Liquefied Hydrocarbon Gas
DOT 105A600W Insulated. Safety Valve (450 psi) (400 psi on Carbon Dioxide Cars).	Carbon Dioxide
DOT 105J600W Thermal Protection. Head Protection. Safety Valve (450 psi).	Liquefied Petroleum Gas Liquefied Hydrocarbon Gas
DOT 105A100ALW Insulated. Safety Valve (75 psi).	Fertilizer Ammoniating Solution (Ammonium Nitrate Solution)

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TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)
DOT 105A200ALW Insulated. Safety Valve (150 psi).	Fertilizer Ammoniating Solution (Ammonium Nitrate Solution)
DOT 105A300ALW Insulated. Safety Valve (225 psi).	Fertilizer Ammoniating Solution (Ammonium Nitrate Solution)
A-4 -- Class 106A (Similar to 110A Tanks)	
DOT 106A500X Multiple Unit with Removable Steel Uninsulated Tanks. Each Tank equipped with Loading and Discharge Valve & Safety Valve or Vent Set for Pressure not Exceeding 375 psi. Popular Name is "Ton Container".	Chlorine Anhydrous Ammonia Sulfur Dioxide Butadiene Chlorine Refrigerant or Dispersant Gases
DOT 106A800X Multiple Unit with Removable Steel, Uninsulated Tanks Mounted on Underframe. Popular Name is "Ton Container". Each Tank equipped with Loading & Discharge Valves & Safety Vent Set for Pressure not Exceeding 600 psi.	Nitrosyl Chloride
A-5 -- Class DOT 107A	
DOT 107A*** Multiple Unit Uninsulated High Pressure Seamless Forged & Drawn Steel Tanks. About 30 Permanently Mounted on Underframe.	Helium Hydrogen Oxygen
A-6 -- Class DOT 109A	
DOT 109A300W Non-insulated or Insulated. Safety Valve (225 psi).	Nitrogen Fertilizer Solution (Ammonium Nitrate Solution) or 115° F [non-insulated]

DOT 109A100ALW Non-insulated or Insulated. Safety Valve (75 psi).	Nitrogen Fertilizer Solution (Ammonium Nitrate Solution)
DOT 109A200ALW Non-insulated or Insulated. Safety Valve (150 psi).	Nitrogen Fertilizer Solution (Ammonium Nitrate Solution)
DOT 109A300ALW Non-insulated or Insulated. Safety Valve (225 psi).	Nitrogen Fertilizer Solution (Ammonium Nitrate Solution)

A-7 -- Class DOT110A (Similar to 106A Tanks)

DOT 110A500W Multiple Unit with Removable Steel Tanks Mounted on Underframe. Popular Name is "Ton Container". Each Tank equipped with Loading & Discharge Valves & Safety Valve or Vent not Exceeding 375 psi.	Sulfur Dioxide Refrigerants
DOT 110A800W Multiple Unit with Removable Steel Tanks Mounted on Underframe. Popular Name is "Ton Container". Each Tank equipped with Loading & Discharge Valves & Safety Valve or Vent not Exceeding 600 psi.	Monobromotrifluoromethane

A-9 -- Class DOT 111A, 112A, 112S, 112J, 112T

DOT 112A200W Non-Insulated (Upper 2/3 of Tank Must be painted with Light-Reflective Paint.) Safety valve (150 psi).	Ethyl Chloride
DOT 112A340W Non-Insulated (Upper 2/3 of Tank Must be painted with Light-Reflective Paint.) Safety valve (225 psi); Alternate setting 280.5 psi for Certain Commodities.	
DOT 112S340W Same as DOT 112A340W Except Equipped with Head Protection.	Anhydrous Ammonia

DOT 112J340W Same as DOT 112A340W Except Equipped with Head Protection and a Thermal Protection Enclosed in a Metal Jacket. No Reflective Paint Required	Liquefied Petroleum Gas

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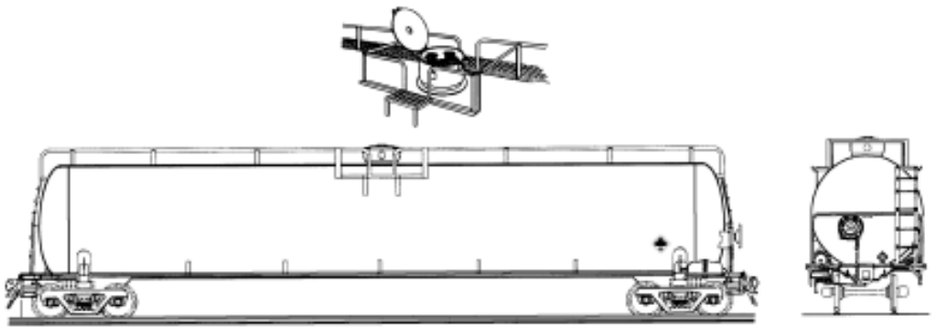
TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)
DOT 112T340W Same as DOT 112A340W Except Equipped with Head Protection and a Non-Jacket Thermal Protection System. No Reflective Paint Required.	
DOT 112A400W Non-Insulated (Upper 2/3 of Tank Must be painted with Light-Reflective Paint). Safety Valve (300 psi). Alternate setting 330 psi for Certain Commodities	
DOT 112S440W Same as DOT 112T400W Except Equipped with Head Protection.	Anhydrous Ammonia

DOT 112J400W



B-END

33,500 GALLON CAPACITY - NONINSULATED
DOT 112J400W
FOR PROPYLENE, LIQUEFIED PETROLEUM GAS
AND ANHYDROUS AMMONIA SERVICE

Same as DOT 112T400W Except Equipped with Head Protection and a Thermal Protection System. Enclosed in a Metal Jacket. No Reflective Paint Required.	Liquefied Petroleum Gas (V.P.) Not Exceeding 300 psi @ 115° F) Vinyl Chloride

DOT 112T400W Same as DOT 112T400W Except Equipped with Head Protection and a Non-Jacket Thermal Protection System. No Reflective Paint Required.	
DOT 112A500W Non-Insulated (Upper 2/3 of Tank Must be painted with Light-Reflective Paint). Safety Valve (375 psi).	
DOT 112S500W Same as DOT 112A500W Except Equipped with Head Protection.	Anhydrous Ammonia
DOT 112J500W Same as DOT 112A500W Except Equipped with Head Protection and a Thermal Protection System. Enclosed in a Metal Jacket. No Reflective Paint Required.	Liquefied Petroleum Gas Vinyl Chloride
DOT 112T500W Same as DOT 112A500W Except Equipped with Head Protection and a Non-Jacketed Thermal Protection System. No Reflective Paint Required.	Liquefied Petroleum Gas Vinyl Chloride

A-10 -- Class 113 (Similar to AAR204W)

DOT 113A60W Insulated. Safety Valve (30 psi)(On Tank). Safety Vent (60 psi)(On Tank). Safety Vent (16 psi)(On Outer Shell).	Hydrogen
DOT 113A175W (Obsolete for New Construction, 10-1-84) Insulated. Gauging Device. Safety Valve (115 psi)(On Tank). Safety Vent (175 psi)(On Tank). Safety Vent (16 psi)(On Outer Shell).	Hydrogen

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Pressure Cars (Page 5)

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TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)
A-11 -- Class 114A, 114S, 114J and 114T	
DOT 114A340W Non-Insulated (Upper 2/3 of Tank Must be painted with Light-Reflective Paint). Manway and Cover May Not be Located at Top of Tank. Safety Valve (225 psi). Alternate Setting 280.5 psi for Certain Commodities. Bottom Outlet or Washout Optional.	
DOT 114S340W Same as DOT 114A340W Except Equipped with Head Protection.	Anhydrous Ammonia
DOT 114J340W Same as DOT 114A340W Except Equipped with Head Protection and a Thermal Protection System. Enclosed in a Metal Jacket. No Reflective Paint Required.	Liquefied Petroleum Gas
DOT 114T340W Same as DOT 114A340W Except Equipped with Head Protection and a Non-Jacketed Thermal Protection System. No Reflective Paint Required.	
DOT 114A400W Non-Insulated (Upper 2/3 of Tank Must be painted with Light-Reflective Paint). Manway and Cover May Not be Located at Top of Tank. Valve and Fittings on Top of Tank. Safety Valve (300 psi). Alternate Setting 330 psi for Certain Commodities.	
DOT 114S400W Same as DOT 114A400W Except Equipped with Head Protection.	Anhydrous Ammonia

DOT 114J00W
Same as DOT 114A400W Except Equipped with Head Protection and a Thermal Protection System. Enclosed in a Metal Jacket. No Reflective Paint Required.

Liquefied Petroleum Gas

DOT 114T400W
Same as DOT 114A400W Except Equipped with Head Protection and a Non-Jacketed Thermal Protection System. No Reflective Paint Required.

AAR TANK CARS: AAR tank cars are for non-regulated commodity services. Most AAR tank cars have DOT counter parts.

B-1 -- Class AAR 203

AAR 203W (Obsolete for New Construction)
Non-Insulated or Insulated. Safety Valve (35* psi) or Safety Vent (45 psi). These Cars Conform, with Certain Exceptions, to Class DOT 103W.

Vegetable Oils
Fish Oils
Wine
Clay
Latex

B-2 -- Class AAR 204 (Similar to DOT 113A)

AAR 204W
Insulated.
Safety Valve (38 psi) (On Tank).
Safety Vent (45 psi) (On Tank)
Safety Vent (17 psi) (On Outer Shell)

Liquid Argon
Liquid Nitrogen
Liquid Oxygen

B-3 -- Class AAR 206 (Similar to DOT 115A)

AAR 206W
Tank Cars are Insulated Non-Pressure having an Inner Container. These cars conform, with Certain Exceptions, to Class DOT 115A.

AAR 207AAW -- AAR207A**ALW**
Non-Insulated or Insulated. Special Granular Non-Regulatory Commodities. Designated for 15 PSIG Minimum Internal Pressure.

Cement
Granular Commodities

ICC TANK CARS
Beginning in 1968, the currently effective ICC tank car classes were redesigned DOT. However, the marking on existing cars of the affected classes is optional and the majority are still marked ICE. (Tank cars of classes no longer effective for new construction, such as riveted and forge welded, remain with ICC markings. For characteristics and typical commodities, see the corresponding DOT classes)

THE PRECEDING MATERIAL WAS MEANT TO PROVIDE A GENERAL DESCRIPTION ONLY, NOT COMPLETE SPECIFICATIONS.

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* Cars built prior to January 1, 1959, may be equipped with (2) 25 psi safety valves.

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Non-Pressure Cars (Page 1)

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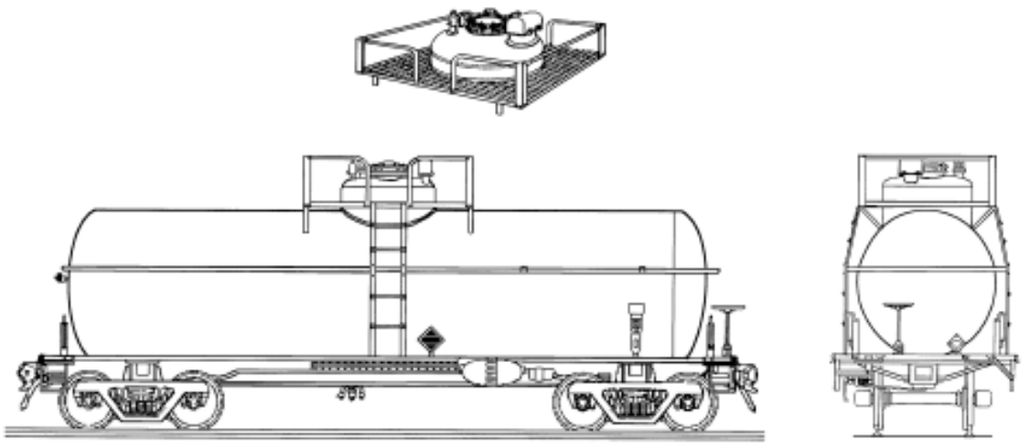
DOT Car Types 103, 104, 111, 115 And AAR Car Types 204, 206 And 211 Are Non-Pressure Cars. These Cars Are Used To Transport Commodities Such As Corn Syrup, Edible Oils And Other General Commodities As Well As A Variety Of Hazardous Materials. The Most Commonly Used Non Pressure Cars Are Types 103 And 111. Drawings Of Several (Not All) Of These Two Types Are Found In This Appendix.

TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)

A-1 -- Class 103

DOT 103W



B-END

10,000 GALLON CAPACITY - INSULATED
FOR GENERAL SERVICE COMMODITIES

Non-Insulated or Insulated.
General Service.
Safety valves (35* psi) or Safety Vent (60 psi).

Phosphorus, Benzene, Gasoline, Vegtable Oil, Caustic Soda, Fuel Oil, Alcohol

DOT 103AW

Non-Insulated or Insulated.
Acid Service.
Safety Valves (35* psi) or Safety Vent (60 psi).

Sulfuric Acid
Oleum
Aqueous Hydrofluoric Acid 60% to 80%
Titanium Tetrachloride

DOT 103ANW

Non-Insulated or Insulated.
Safety Valves (35* psi) or Safety Vent (60 psi).

Phosphorous Oxychloride
Phosphorus Trichloride
Benzyl Chloride
Chloroacetyl Chloride

DOT 103ALW Non-Insulated or Insulated. Safety Valves (35* psi) or Safety Vent (60 psi).	Acetic Acid, Acetic Anhydride, Acrylonitrile, Ethylene Glycol, Glycerine, Butraldehyde, Hydrogen Peroxide (Under 52% by weight), Fatty Acids
DOT 103A-ALW Non-Insulated or Insulated. Safety Valves (35* psi) or Safety Vent (60 psi).	Hydrogen Peroxide Hydrazine Nitric Acid (80% or more)
DOT 103BW Non-Insulated or Insulated. Rubber Lined Tank. Safety Vent (60 psi).	Hydrochloric Acid not over 38% by weight Zinc Chloride Phosphoric Acid Ferric Chloride Aluminum Sulfate

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* Cars built prior to January 1, 1959, may be equipped with (2) 25 psi safety valves.

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TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)
DOT 103CW Non-Insulated or Insulated. Safety Valve (35** psi).	Nitric Acid Hydrazine Chlorosulfonic Acid Formic Acid
DOT 103DW Non-Insulated or Insulated. Safety Valve (35* psi) or Safety Vent (60 psi).	Acetic Acid, Whiskey Ethyl Alcohol, Caramel Fruit Juices, Vegetable Juices
DOT 103EW Non-Insulated or Insulated. Safety Valve (35* psi) or Safety Vent (60 psi).	Phosphoric Acid Chlorosulfonic Acid Diisooctyl Acid Phosphate
A-2 -- Class 104	
DOT 104W Insulated. Safety Valves (35* psi) or Safety Vent (60 psi).	Ethyl Ether Casinghead Gasoline Refined Vegetable Oils
A-8 -- Class DOT111A	
DOT 111A60W1 (DOT 111A60F1) Non-Insulated or Insulated. Safety Valve (35 psi) or Safety Vent (60 psi).	Benzene Gasoline Alcohol Caustic Soda Fuel Oil
DOT 111A60W2 Non-Insulated or Insulated. Safety Valve (35 psi) (Required on Certain Commodities) or Safety Vent (60 psi).	Aqueous Hydrofluoric Acid, 60% to 80% Mixed Acid Sulfuric Acid Titanium Tetrachloride

DOT 111A60W5
Non-Insulated or Insulated.
Rubber Lined Tank.
Safety Vent (60 psi).

Hydrochloric Acid not over 38% by weight
Phosphoric Acid
Aluminum Sulfate

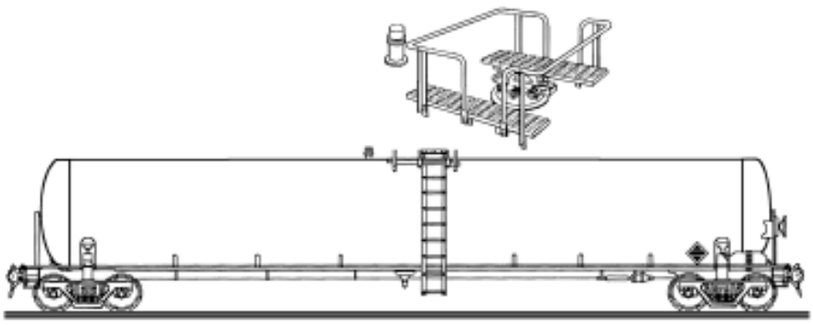
DOT 111A60W7
Non-Insulated or Insulated.
Safety Valve (35 psi) or Safety Vent (60 psi).

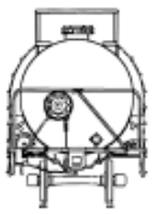
Oluem

DOT 111A60ALW1
Non-Insulated or Insulated.
Safety Valve (35 psi) or Safety Vent (60 psi).

Acetic Acid, Acetic Anhydride, Acrylonitrile, Fatty Acids, Ethylene Glycol, Glycerine, Butraldehyde, Hydrogen Peroxide (under 52% by Weight)

DOT 111A100W1 (DOT 111A100F1)





B-END

26,000 GALLON CAPACITY - NONINSULATED
DOT 111A100W1
FOR GENERAL SERVICE COMMODITIES
.2181"/FT TOP & BOTTOM SLOPE

Non-Insulated or Insulated.
Safety Valve (75 psi) or Safety Vent (100 psi).

Kerosene, Gasoline, Fuel Oil, Vegetable Oils, Phosphorus

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* Cars built prior to January 1, 1959, may be equipped with (2) 25 psi safety valves.
** Cars built prior to January 1, 1959, may be equipped with 45 psi safety valve.

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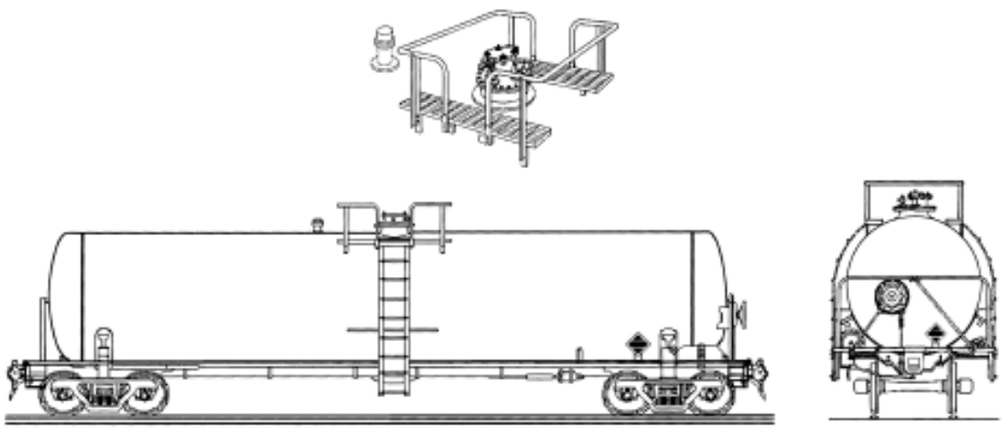
TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)

DOT 111A100W1 (DOT 111A100F1)



B-END

13,600 GALLON CAPACITY - NONINSULATED
DOT 111A100W2
FOR SULFURIC ACID SERVICE
POST 1982

Safety Valve (75 psi) or Safety Vent (100 psi). Non-Insulated or Insulated. Safety Valve (75 psi) (Required on Certain Commodities) or Safety Vent (100 psi).	Vegetable Oils, Phosphorus, Aqueous Hydrofluoric Acid (60% to 80%), Mixed Acid, Sulfuric Acid

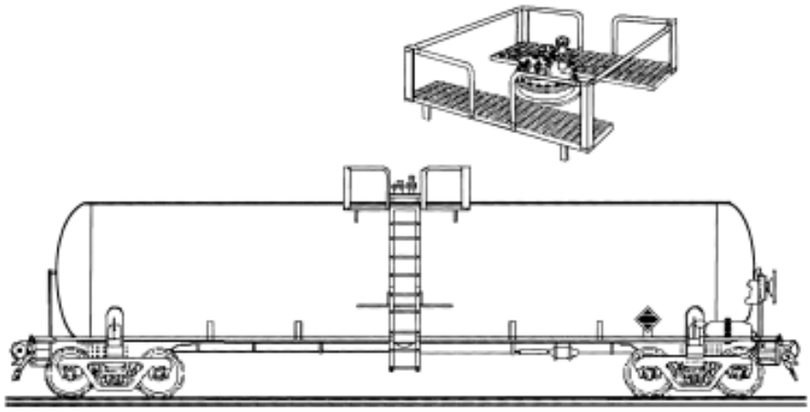
DOT 111A100W3

Insulated. Safety Valve (75 psi) or Safety Vent (100 psi).	Casinghead Gasoline, Ethyl Ether

DOT 111A100W4

Insulated. Safety Valve (75 psi).	Aqua Ammonia Solution containing Anhydrous Ammonia

DOT 111A100W5



B-END

20,000 GALLON CAPACITY - NONINSULATED
DOT 111A100W5
FOR HYDROCHLORIC ACID SERVICE
PRE 1983

Non-Insulated or Insulated.
Rubber Lined Tank.
Safety Vent (100 psi).

Hydrochloric Acid not over 38% by weight, Phosphoric Acid, Aluminum Sulfate

_____
* Converted high pressure forge-welded tank.

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TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED (typical commodities only listed, there may be others)
DOT 111A100W6 Non-Insulated or Insulated. Safety Valve (75 psi) or Safety Vent (100 psi).	Acetic Acid, Caprolactam, Hydrazine, Fruit Juices, Vegetable Juices, Whiskey
A-12 -- DOT115A (Similar to AAR206W)	
DOT 115A60W1 Insulated (Tank-within-a-Tank). Safety Valve (35 psi) or Safety Vent (45 psi).	Latex, Methyl Methacrylate (Proposed)
DOT 115A60W6 Insulated (Tank-within-a-Tank). Safety Valve (35 psi) or Safety Vent (45 psi).	Caramel Coloring, Corn Syrup
DOT 115A60ALW Insulated (Tank-within-a-Tank). Safety Valve (35 psi) or Safety Vent (45 psi).	
AAR TANK CARS: AAR tank cars are for non-regulated commodity services. Most AAR tank cars have DOT counter parts.	
B-1 -- Class AAR 203	
B-2 -- Class AAR 204 (Similar to DOT 113A)	
AAR 204W Insulated. Safety Valve (38 psi) (On Tank). Safety Vent (45 psi) (On Tank). Safety Vent (17 psi) (On Outer Shell).	Liquid Argon, Liquid Nitrogen, Liquid Oxygen
B-3 -- Class AAR 206 (Similar to DOT 115A)	

AAR 206W
Tank Cards are Insulated Non-Pressure having an Inner Container. These cars conform, with Certain Exceptions, to Class DOT 115A.

AAR207AAW -- AAR207A**ALW**
Non Insulated or Insulated.
Special Granular Non-Regulatory Commodities.
Designed for 15 PSIG Minimum Internal Pressure.

Cement
Granular Commodities

B-5 -- Class AAR 208

AAR208
Non-Pressure Cars having Wood Staved Metal Hooped Tanks for the Transportation of Certain Food Stuffs or Other Acidic Products. Safety Relief Devices are Not Required.

Vinegar
Pickle Liquor

B-6 -- Class AAR 221A

AAR 211A60W1 -- AAR 211A100W1
Non-Insulated or Insulated.

Corn Syrup, Molten Sulfur, Edible & Inedible Oils, Latex, Wine, Glycerol

---

AAR 211A60W2 -- AAR 211A100W2
Non-Insulated or Insulated.

Phosphoric Acid, Liquid Alum

AAR 211A100W6
Non-Insulated or Insulated.

Caprolactam

AAR 211A60W7
Non-Insulated or Insulated.

Lactic Acid

AAR 211A60ALW1 -- AAR 211A100ALW1
Non-Insulated or Insulated.

Glycerine, Glycol, Nitrogen Fertilizer Solution

ICC TANK CARS
Beginning in 1968, the currently effective ICC tank car classes were redesigned DOT. However, the marking on existing cars of the affected classes is optional and the majority are still marked ICC. (Tank cars of classes no longer effective for new construction, such as riveted and forge welded, remain with ICC markings. For characteristics and typical commodities, see the corresponding DOT classes.)

THE PRECEDING MATERIAL WAS MEANT TO PROVIDE A GENERAL DESCRIPTION ONLY, NOT COMPLETE SPECIFICATIONS.

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Stencil Requirements

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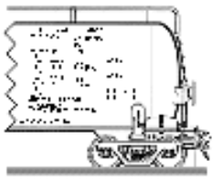
Click link under thumbnail for enlarged version.

Side View Left



Side View Right

B-End View

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Stencil Requirements

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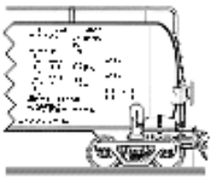
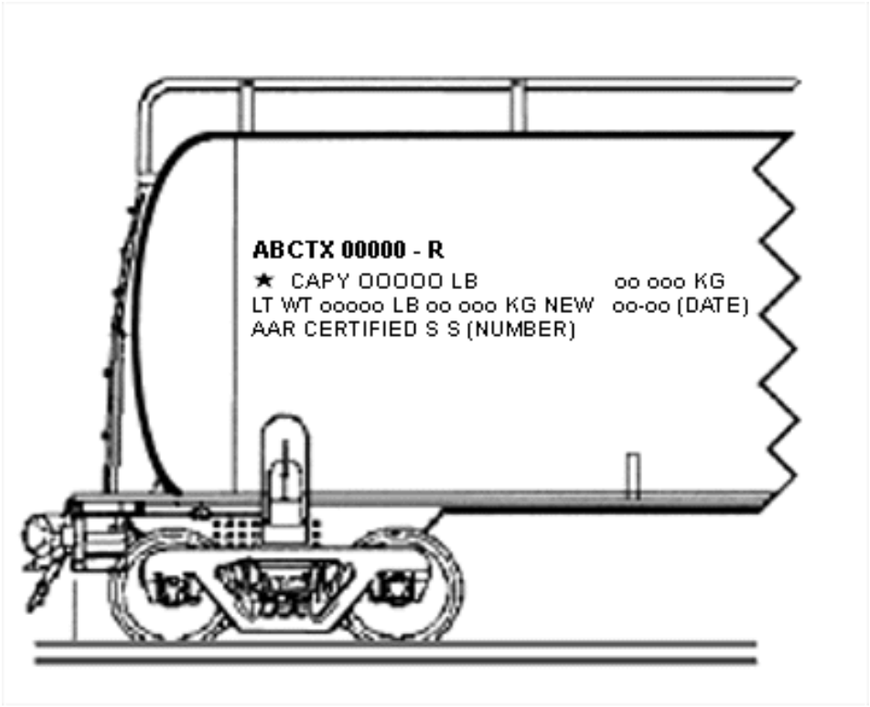
Side View Left



Side View Right

B-End View

Stencil Requirements - Side View Left



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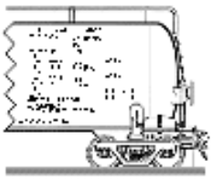
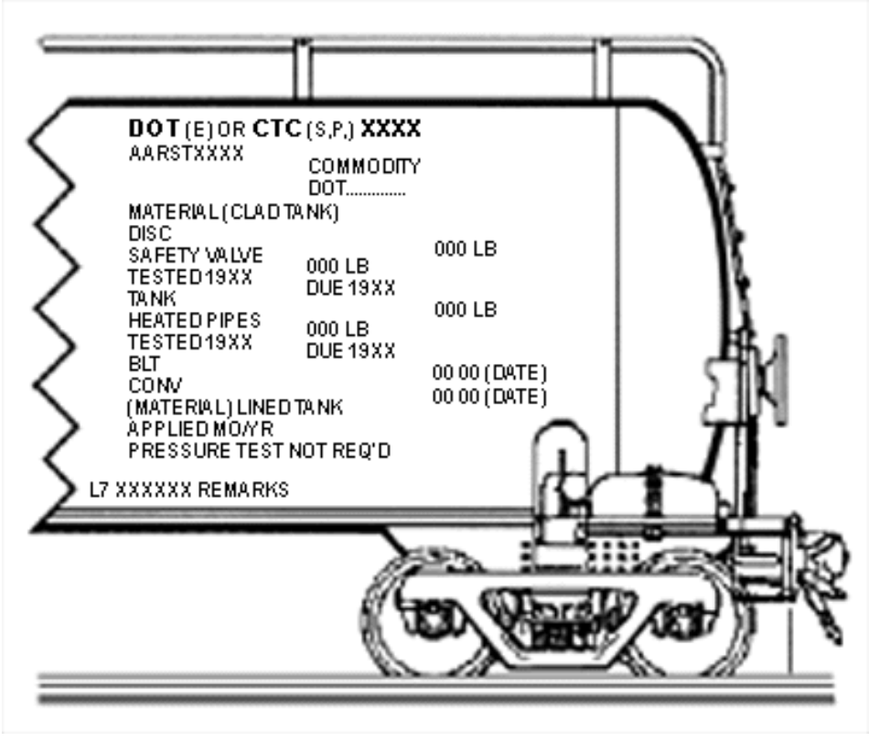
Side View Left



Side View Right

B-End View

Stencil Requirements - Side View Right



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Stencil Requirements

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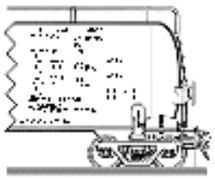
Click link under thumbnail for enlarged version.

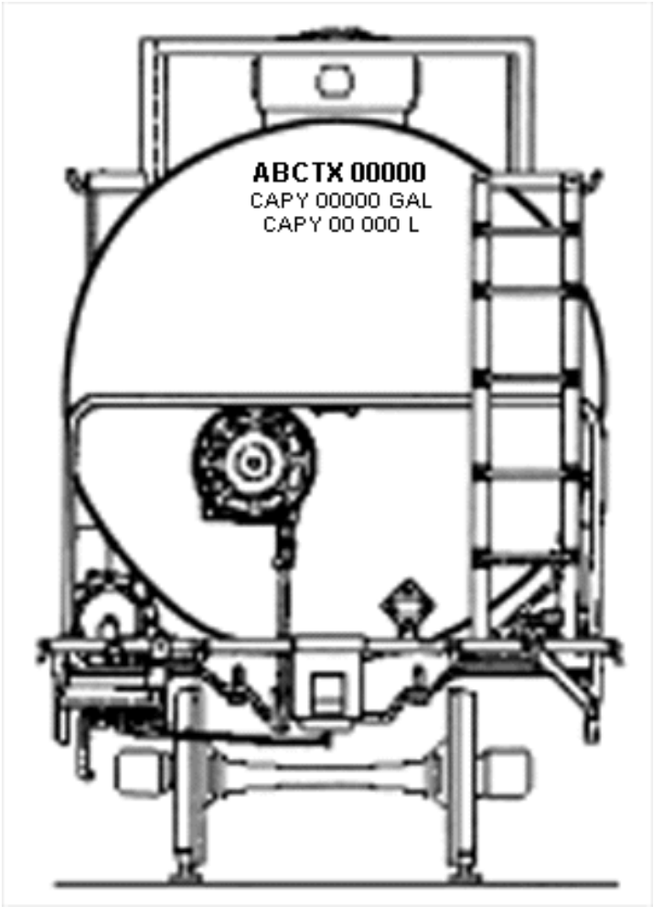
Side View Left



Side View Right

B-End View

Stencil Requirements - B-End View



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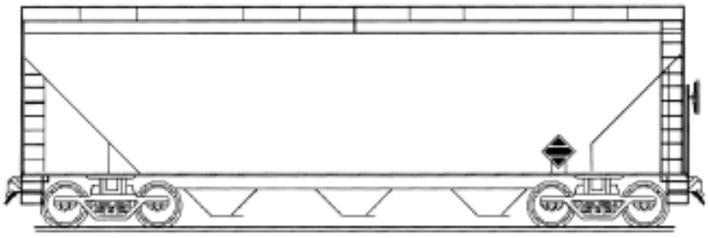
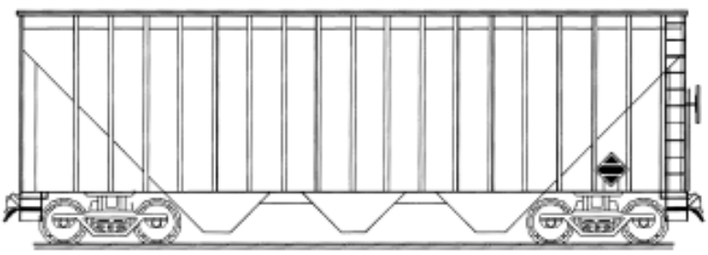
Other Rail Cars (Page 1)

COVERED HOPPER



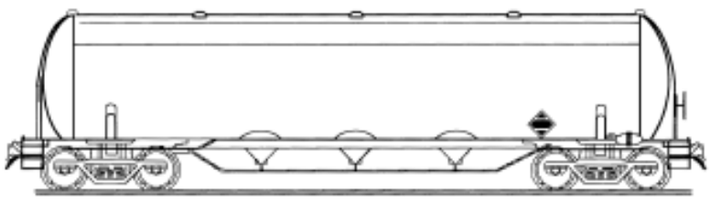
COVERED HOPPER
CARRIES CALCIUM CARBIDE, CEMENT, GRAIN

OPEN TOP HOPPER



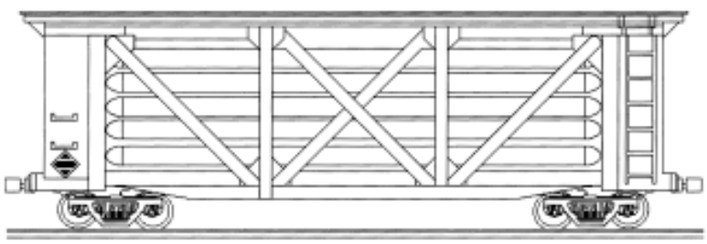
OPEN TOP HOPPER
CARRIES COAL, ROCK, SAND

PNEUMATIC HOPPER



PNEUMATIC HOPPER
CARRIES PLASTIC PELLETS, FLOUR, OTHER FINE-POWDERED MATERIALS

TUBE CAR



TUBE CAR
CARRIES HELIUM, HYDROGEN, METHANE, OXYGEN, OTHER GASES

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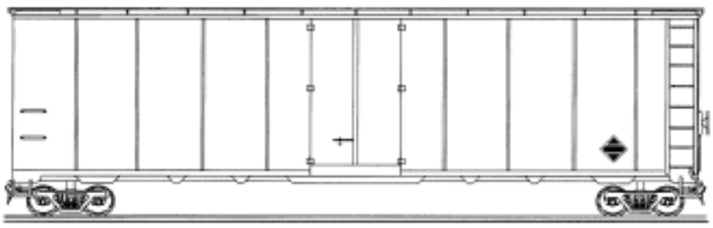
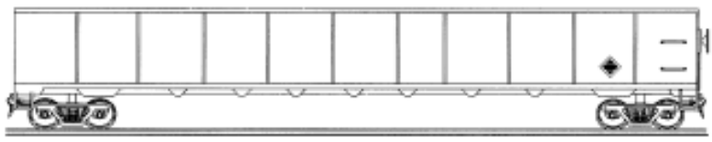
BOX CAR



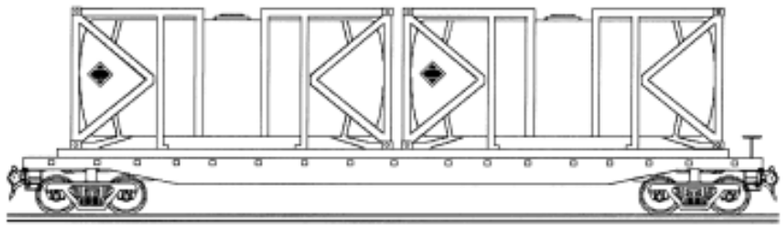
BOX CAR
CARRIES ALL TYPES OF MATERIAL AND FINISHED GOODS

GONDOLA



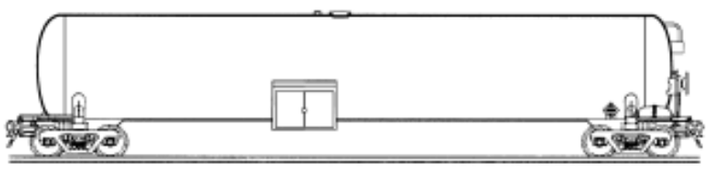
GONDOLA
CARRIES SAND, ROLLED STEEL AND OTHER PRODUCTS AND MATERIALS THAT DO NOT REQUIRE PROTECTION FROM THE WEATHER

FLAT BED CAR WITH INTERMODAL TANKS



FLAT BED CAR WITH INTERMODAL TANKS
CARRIES VARIOUS PRODUCTS IN CONTAINERS, I.E., ONE-TON CHLORINE CYLINDERS, INTERMODAL CONTAINERS (SHOWN), LARGE VEHICLES, OTHER COMMODITIES THAT DO NOT REQUIRE PROTECTION FROM THE WEATHER

CRYOGENIC CAR



CRYOGENIC CAR
CARRIES LIQUID OXYGEN, LIQUID NITROGEN, LIQUID CARBON DIOXIDE, LIQUID HYDROGEN, OTHER GASES THAT HAVE BEEN LIQUEFIED BY LOWERING THEIR TEMPERATURE

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Cargo Tank Trucks (Page 1)

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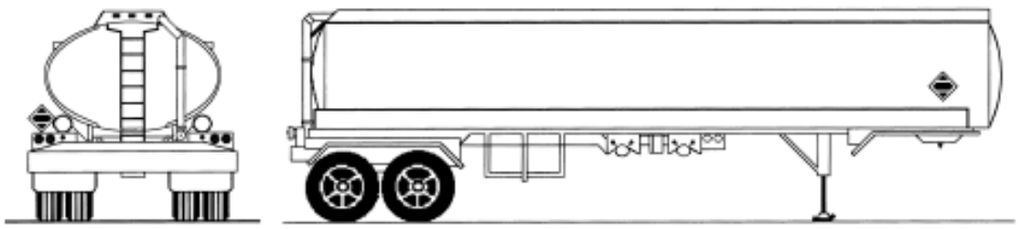
There are many variations and modifications to trailers and tankers. This material is provided as general information on the listed classifications.

TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED

DOT 406/MC 306 Non Pressure Liquid Tank

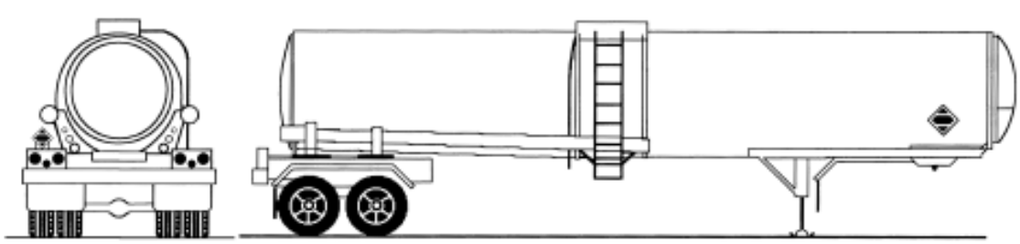


DOT 406/MC-306 ATMOSPHERIC PRESSURE TANK TRUCK
9,000 GALLONS CAPACTIY
GENERAL PURPOSE CARGO

OPS Pressure Less Than 3 PSI
Typical Maximum Capacity 9,000 Gallons
New Tanks Aluminium
Older Tanks Steel
Oval Shape/Multiple Compartments
Recessed Manholes/Rollover Protection
Bottom Valves
Will Likely have Vapor Recovery.

Gasoline
Fuel Oil
Alcohol
Other Flammable/Combusible Liquids
Liquids
Liquid Fuel Products
(In Non-Coded Tankers)

DOT 407/MC 307 Low Pressure Chemical Tank



DOT 407/MC-307 LOW PRESSURE TANK TRUCK
6,000-7,000 GALLONS CAPACTIY
TRANSPORTS CHEMICALS, FLAMMABLE AND COMBUSTIBLE LIQUIDS

OPS @ 25-40 PSI
Typical Maximum Capacity 6,000 Gallons
May Be Rubber Lined/Steel
Single or Double Top Manhole
Single Outlet Discharge for Each
&nbps; Compartment At Bottom (Midship Or Rear)
Tupically Double Shell
Stiffening Rings
Rollover Protection
May Be Multiple Compartments
Horseshoe Or Round Shaped
Unit Pictured Is Insulated And Covered With Smooth Metal Skin
Tank Has Several Stiffing Rings

Flammable Liquids
Combusible Liquids
Acids
Caustics
Poisons

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Cargo Tank Trucks (Page 2)

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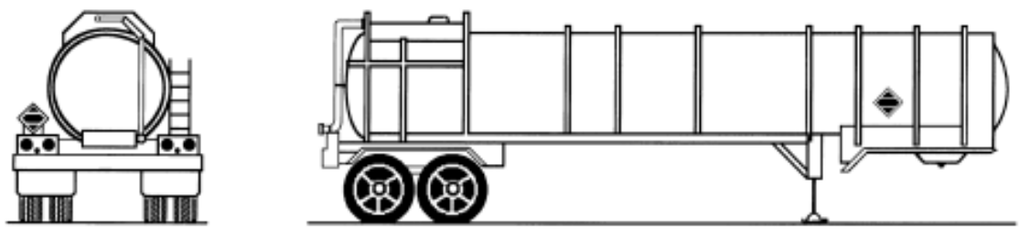
TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED

MC-312 Corrosive Liquid Tank

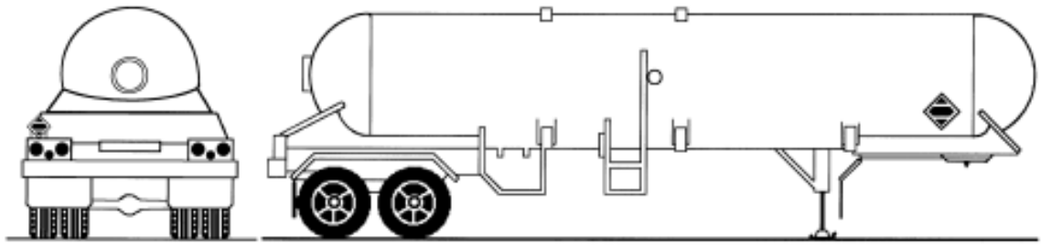


MC-312 CORROSIVE LIQUID TANK

OPS Pressure Less Than 75 PSI
Typical Maximum Capacity 6,000 Gallons
May Be Rubber Lined/Steel
Stiffening Rings And Rollover Protection
Splash Guard Provides Rollover Protection
Top Loading At Rear Or Center
Loading Area Typically Coated With Corrosive Resistant Material
Small Diameter For Length (Tube Shaped)
Typical Single Compartment

Corrosive Liquids
Typically Acids

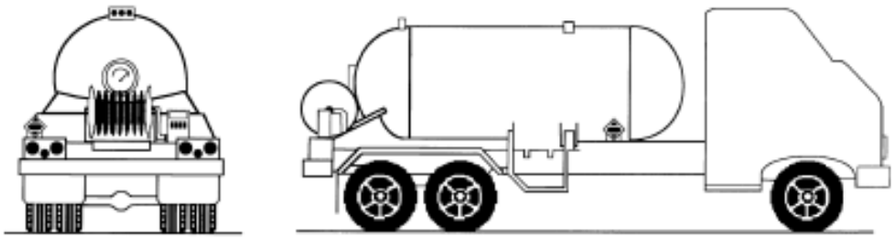
MC-331 High Pressure Tank



MC-331 HIGH PRESSURE TANK TRUCK
11,500 GALLONS CAPACITY
TRANSPORTS LP GAS AND ANHYDROUS AMMONIA

OPS Pressure UP To 300 PSI
Typical Maximum Capacity 11,500 Gallons
Single Steel Compartment/Non Insulated
Bolted Manhole At Front or Rear
Internal and Rear Outlet Valves
Typically Painted White Or Other Reflective Color
May Be Marked Flammable Gas and Compressed Gas
Round/Dome Shaped Ends

Pressurized Gases & Liquids
Anhydrous Ammonia
Propane
Butane
Other Gases That Have Been Liquefied Under Pressure



BOBTAIL TANK -- LOCAL DELIVERY OF LP GAS AND ANHYDROUS AMMONIA

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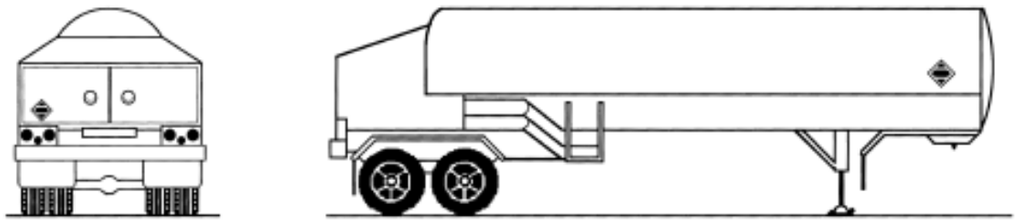
TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED

MC-338 Cryogenic Liquid Tank



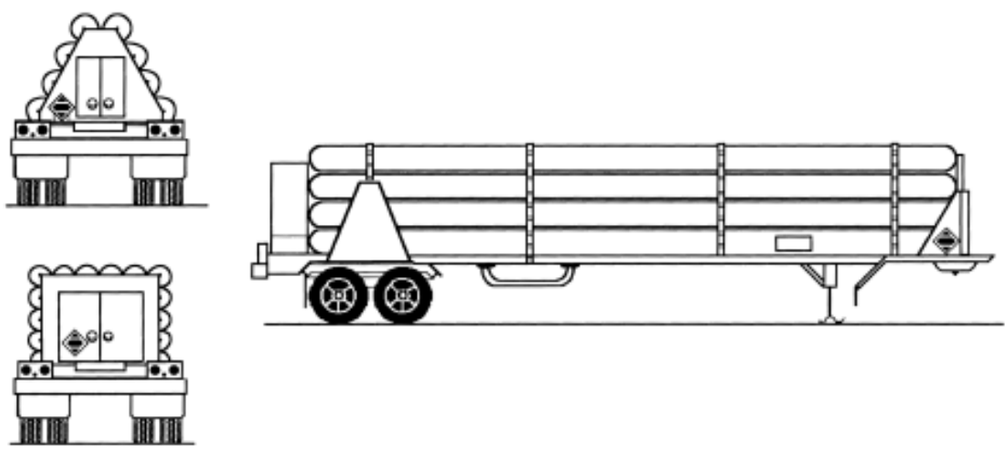
MC-338 CRYOGENIC LIQUID TANK TRUCK
WELL-INSULATED 'THERMOS BOTTLE' DESIGN
TRANSPORTS LIQUID NITROGEN, OXYGEN CARBON DIOXIDE, ETC.

OPS AT Less THAN 22 PSI
Well Insulated Thermos Bottle Like Steel Tank
May Have Vapor Discharging from Relief Valves
Loading/Unloading Valves Enclosed at Rear
May Be Marked "Refrigerated Liquid"
Round Tank with Same Type of Cabinet at Rear

Liquid Oxygen
Liquid Nitrogen
Liquid Carbon Dioxide
Liquid Hydrogen
Other Gases That Have Been Liquefied by Lowering Their Temperature

---

Compressed Gas/Tube Trailer



COMPRESSED GAS TRAILER
3,000-5,000 PSI
TRANSPORTS COMPRESSED GAS

OPS at 3,000-5,000 PSI (Gas Only)
Individual Steel Cylinders Stacked and Banded Together
Typically will have Over Pressure Device for each cylinder
Bolted Manhole At Front or Rear
Valving at Rear (Protected)
Manufacturer Name May Be on cylinders, i.e. AIRCO, Liquid Air, Liquid Carbonic, etc
Flat Truck with Multiple Cylinder Stacked in Modular or Nested Shape

Helium
Hydrogen
Methane
Oxygen
Other Gases

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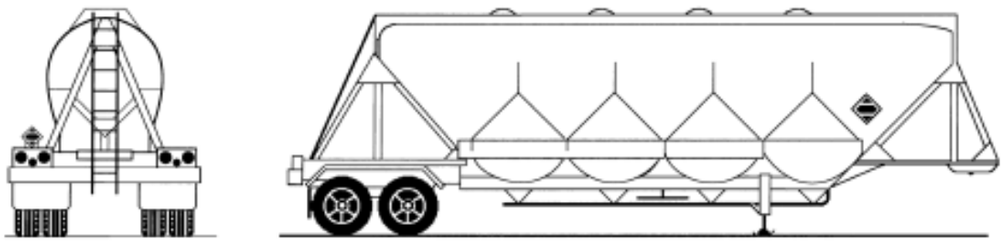
TANK DESCRIPTION	TYPICAL COMMODITIES TRANSPORTED

Dry Bulk Cargo Tanker

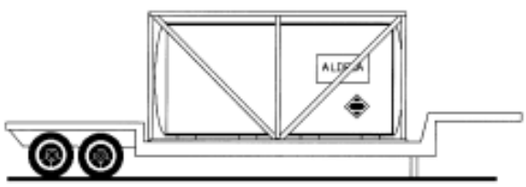


DRY BULK CARGO TANKER

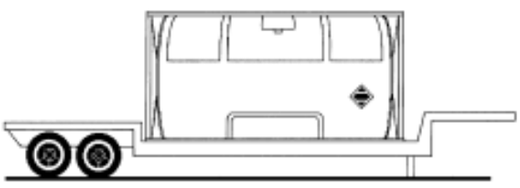
OPS AT Less THAN 22 PSI
Typically Not Under Pressure
Over the Road
Top Side Manholes
Bottom Valves/Air Assisted Loading/Unloading
Shapes Vary, But Will Have Hoppers

Calcium Carbide
Oxidizers
Corrosive Solids
Cement
Plastic Pellets
Fertilizers

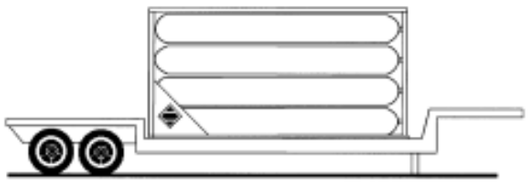
Intermodal Containers**



NON-PRESSURE OR PRESSURE TANK



CRYOGENIC TANK



TUBE MODULES

** ALL THREE TYPES MAY ALSO BE FOUND ON RAIL CARS OR ABOARD SHIPS.

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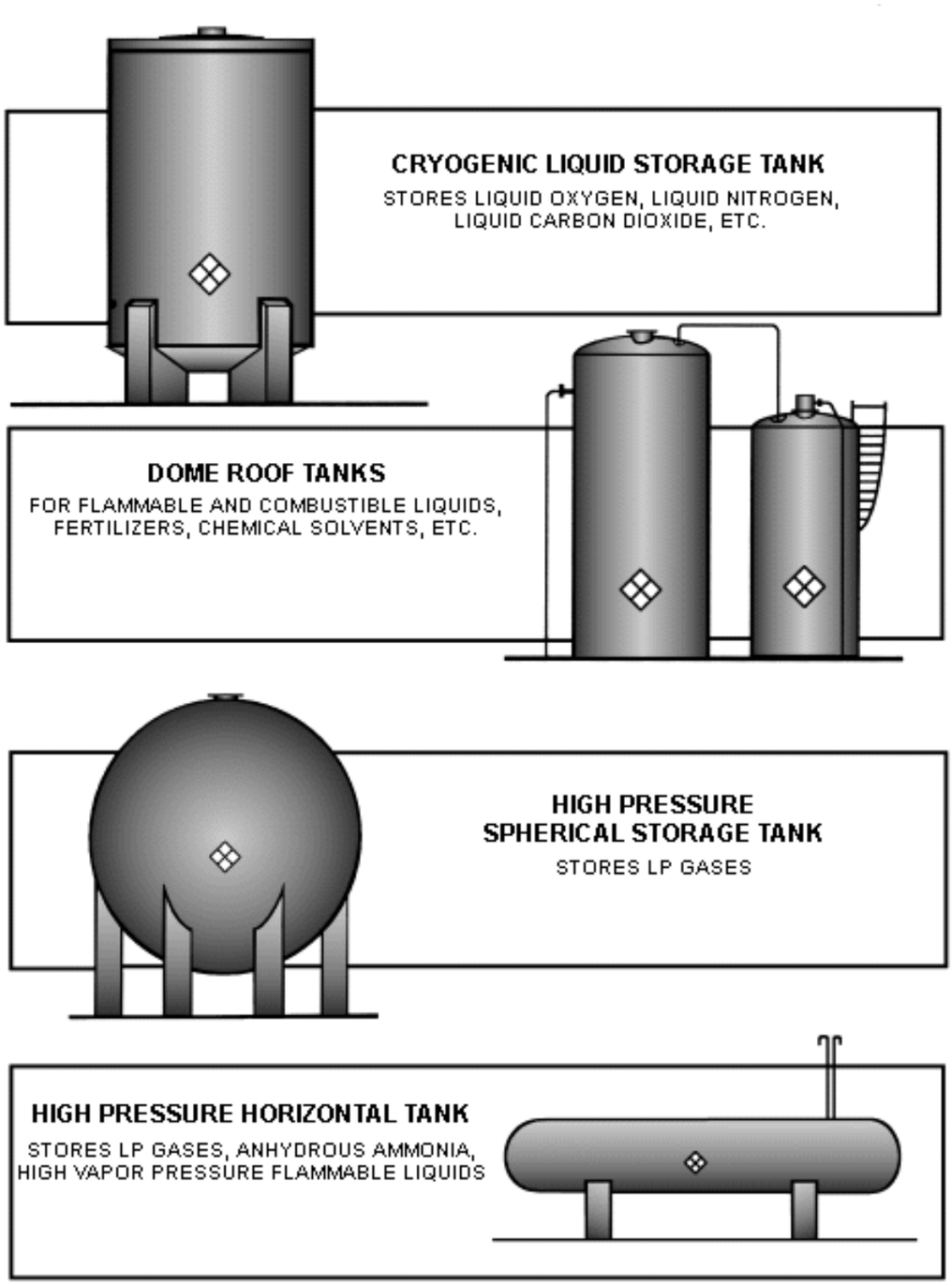

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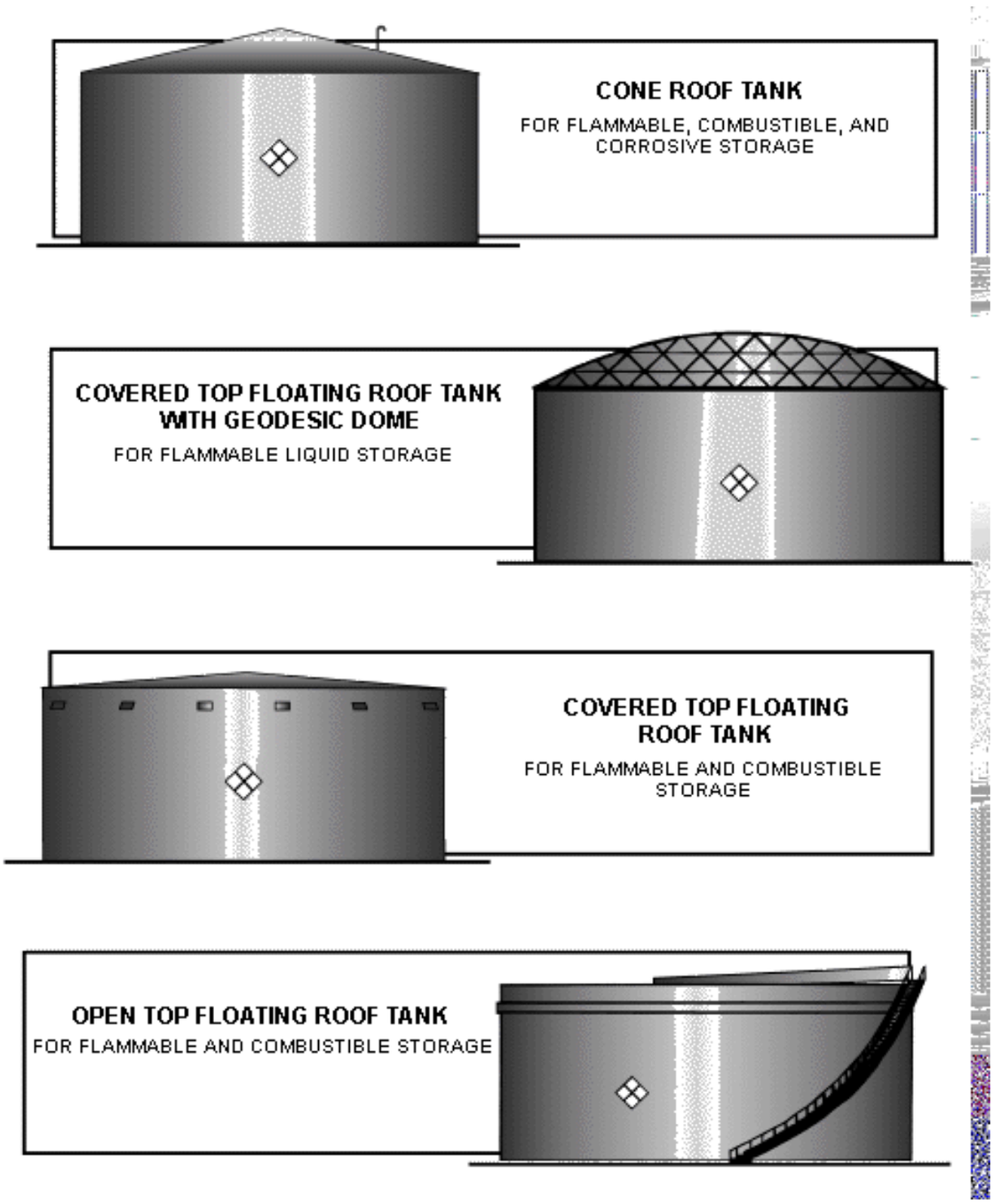

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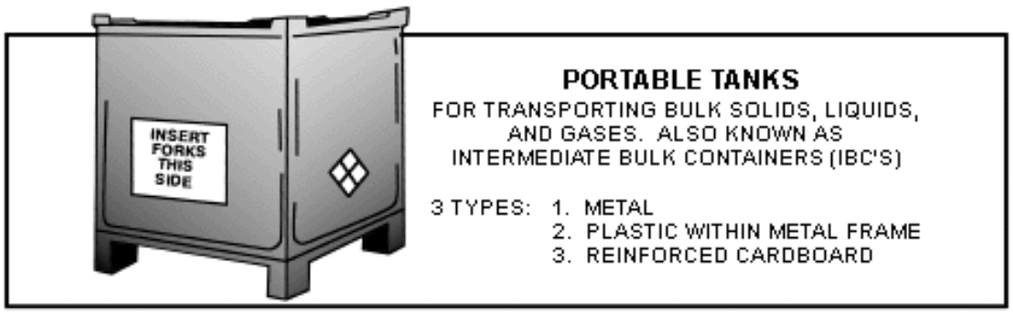

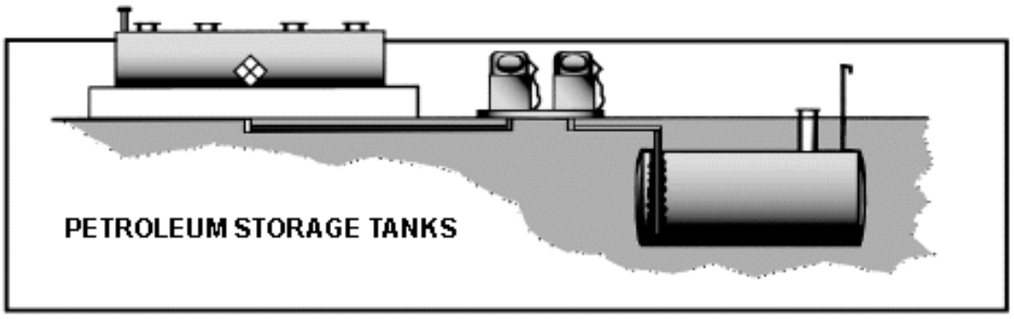

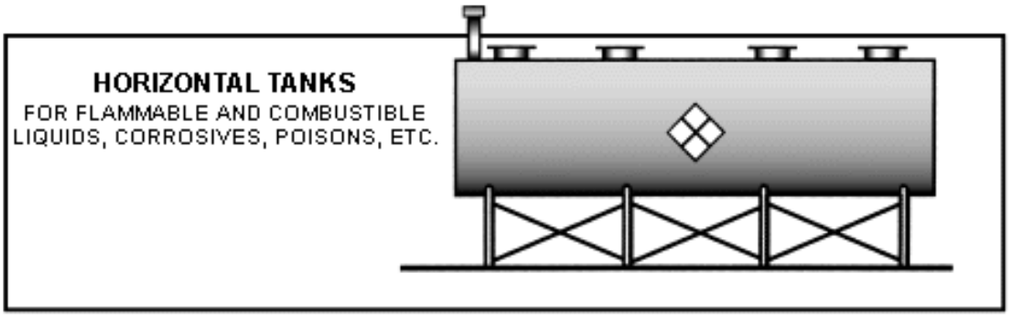

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Aa - Al

Each of the following chemical pages is in portable document format (PDF) and requires the **Adobe Acrobat Reader** to open / read the file.

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Chemical Pages

Acetyl peroxide solution
2-Acetylaminofluorene
Acetylene
Acetylene dichloride
Acetylene tetrachloride
Acetylene trichloride
Acetylenogen
Acetylsilicon trichloride

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Acid
Acridine
Acroleic acid
Acrolein
Acryladehyde
Acrylamide
Acrylic acid
Acrylic acid chloride
Acrylic acid, butyl ester
Acrylic acid, ethyl ester
Acrylic acid, methyl ester
Acrylic amide
Acrylonitrile
Acryloyl chloride
Acrylyl chloride
Actidione
Actidone
Adipic acid
Adipic acid dinitrile
Adiponitrile
Agent T
Alachlor
Alcide
Aldicarb
Aldifen
Aldrin
Algrain
Alkyl benzene sulfonic acids
Allene
Allene-methyl acetylene mixture
Allethrin
Allyl acetate
Allyl al
Allyl alcohol
Allyl aldehyde
Allyl bromide
Allyl chloride
Allyl chlorocarbonate
ALLYL CHLOROFORMATE
Allyl ether
Allyl ethyl ether
Allyl iodide
Allyl isothiocyanate
Allylamine
Allylic alcohol
Allyltrichlorosilane
alpha-Bromotoluene
alpha-Chlorobenzaldehyde

alpha-Chloropropionic
alpha-Chlorotoluene

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alpha-Cumene hydroperoxide
alpha-Endosulfan
alpha-Methacrylic acid
alpha-Methyl benzyl alcohol
alpha-Methyl styrene
alpha-Naphthylamine
alpha-Pinene
alpha-Tolunitrile
Aluminum (dust)
Aluminum borohydride
Aluminum chloride
Aluminum fluoride
Aluminum nitrate
Aluminum oxide
Aluminum phosphide
Aluminum sulfate
Aluminum, triisobutyl

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Ammonium bifluoride
Ammonium bisulfite
Ammonium bromide
Ammonium carbamate
Ammonium carbonate
Ammonium chloride
Ammonium chromate
Ammonium citrate

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Ammonium dichromate
Ammonium fluoborate
Ammonium fluoride
Ammonium formate
Ammonium gluconate
Ammonium hydroxide
Ammonium hypophosphite
Ammonium iodide
Ammonium lactate
Ammonium lauryl sulfate
Ammonium molybdate
Ammonium monosulfide
Ammonium nitrate
Ammonium nitrate fertilizers
Ammonium nitrate: fuel oil
Ammonium nitrate-phosphate mixture
Ammonium nitrate-sulfate mixture
Ammonium nitrate-urea solution
Ammonium oleate
Ammonium oxalate
Ammonium pentaborate
AMMONIUM PERCHLORATE
Ammonium perchlorate high explosive
Ammonium perchlorate oxidizer
Ammonium permanganate
Ammonium persulfate
Ammonium phosphate
Ammonium picrate (wet)
Ammonium rhodanate
Ammonium silicofluoride
Ammonium stearate
Ammonium sulfamate
Ammonium sulfate
Ammonium sulfide
Ammonium sulfite
Ammonium sulfocyanide
Ammonium sulphite
Ammonium tartrate
Ammonium thiocyanate
Ammonium thiosulfate
AMS
Amthio
Amyl alcohol
Amyl methyl ketone
Amyl phthalate
Amylol
Amyltricholorsilane
AN/FO

Anhydrol
Anhydrous ammonia

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Anhydrous ethanol
Anhydrous hydrobromic acid
Anhydrous hydrofluoric acid
Aniline
Aniline oil
Anisole
Anisoyl chloride
Anone
Ansul ether
Anthion
Anthracene
Antimony (powder)
Antimony pentachloride
Antimony pentafluoride
Antimony potassium tartrate
Antimony tribromide
Antimony trichloride
Antimony trifluoride
Antimony trioxide
ANTU
Aqua fortis
Aqueous ammonia
Aramite
Arctic
Argon
Arsenic
Arsenic acid
Arsenic butter
Arsenic chloride
Arsenic dichloroethane
Arsenic disulfide
Arsenic hydride
Arsenic pentoxide
Arsenic trichloride
Arsenic trihydride
Arsenic trioxide
Arsenic trisulfide
Arsenous chloride
Arsenous trichloride
Arsine
Asbestos
Asphalt
Asphalt blending stocks: roofers flux
Asphalt blending stocks: straight run residue
asym-Dimethylhydrazine
Atrazine
Auramine
Avitrol
Azabenzene
Azacyclohexane
Azacyclopropane
Azide
Azine
Azirane

Aziridine
Azophos

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Benzoic aldehyde
Benzoic trichloride
Benzol
Benzonitrile
Benzophenone
Benzoquinone
1,4-Benzoquinone
Benzotrichloride
Benzoyl chloride

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Benzoyl peroxide
Benzoylamide
Benzyl acetate
Benzyl alcohol
Benzyl amine
Benzyl bromide
Benzyl carbonyl chloride
Benzyl chloride
Benzyl chlorocarbonate
Benzyl chloroformate
Benzyl cyanide
Benzyl dichloride
Benzyl dimethyl amine
Benzyl dimethyl octadecyl ammonium chloride
Benzyl ether
Benzyl iodide
Benzyl nitrile
Benzyl oxide
Benzyl trichloride
Benzyl trimethyl ammonium chloride
Benzyl violet
Benzylene chloride
Benzylidene chloride
Beryllium
Beryllium chloride
Beryllium fluoride
Beryllium nitrate
Beryllium oxide
Beryllium sulfate
beta-Butyrolactone
beta-Chloroprene
beta-Endosulfan
beta-Methyl acrolein
beta-Propiolactone

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Bolero
Bondolane A
Bonoform
Boric acid
Borneol
Boroethane
Boron bromide
Boron chloride
Boron fluoride

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Boron hydride
Boron hydride
Boron hydride
Boron tribromide
Boron trichloride
Boron trifluoride
Boron trifluoride: dimethyl etherate
Bottled gas
BPL
Brimstone
Brom
Bromacil
Bromadiolone
Bromide fluoride
Bromine
Bromine chloride
Bromine cyanide
Bromine fluoride
Bromine pentafluoride
Bromine trifluoride
3-Bromo-1-propene
1-Bromo-3-methylbutane
Bromoacetic acid
Bromoacetone
Bromoacetyl bromide
Bromoallylene
Bromobenzene
1-Bromobutane
2-Bromobutane
Bromochloromethane
Bromocyan
Bromoethanoyl bromide
Bromoethene
2-Bromoethyl ethyl ether
Bromoethylene
Bromoform
Bromofume
Brom-O-Gas
Bromomethane
2-Bromopentane
4-Bromophenyl phenyl ether
Bromophenylmethane
1-Bromopropane
2-Bromopropane
3-Bromopropylene
Bromopropyne
3-Bromopropyne

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Calcium resinate
Camphene
Camphor oil
Cantharidin
CAP
Caproic acid
Caprolactam
Capronic acid
Caprylene

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Capsicum
Capsine
Captan
Carbachol
Carbachol chloride
Carbacholin
Carbacholine dichloride
Carbacryl
Carbamic acid, ammonium salt
Carbamide peroxide
Carbamiotin
Carbamoyl dimethyl chloride
Carbamyl
Carbaryl (solid)
Carbide
Carbinol
Carbofuran
Carbolic acid
Carbolic oil
Carbon bisulfide
Carbon chloride
Carbon dichloride oxide
Carbon difluoride
Carbon dioxide
Carbon disulfide
Carbon disulphide
Carbon monoxide
Carbon nitride
Carbon oxide
Carbon oxide sulfide
Carbon oxychloride
Carbon oxyfluoride
Carbon oxysulfide
Carbon sulfide
Carbon tet
Carbon tetrachloride
Carbona
Carbonic acid anhydride
Carbonic acid gas
Carbonic acid, diethyl ester
Carbonic anhydride
Carbonic difluoride oxide
Carbonic ether
Carbonic oxide
Carbonochloride acid, ethyl ester
Carbonyl chloride
Carbonyl fluoride

Carbonyl sulfide
Carene
Casing head gasoline

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Castor oil, edible
Caswell No 805
Catechol
Caustic potash solution
Caustic soda
Caustic soda, solution
Cellon
Certox
Cesium
CHA
Chloral
Chlorallylene
Chloramben
Chlorbisan
Chlordane, flammable liquid
Chlordecone
ChlorexDichloroethyl ether
Chlorfenvinfos
Chloride of phosphorus
Chlorine
Chlorine cyanide
Chlorine dioxide
Chlorine dioxide hydrate
Chlorine dioxide hydrate (frozen)
Chlorine fluoride
Chlorine monoxide
Chlorine pentafluoride
Chlorine peroxide
Chlorine sulfide
Chlorine trifluoride
Chlormephos
Chlormequat chloride
2-Chloro-acetophenone
2-Chloro-benzalmalonoitrile
Chloro methyl sulfane
Chloro(chloromethoxy) methane
2-Chloro-1,3-butadiene
2-Chloro-1-ethanol
4-Chloro-1-methylbenzene
1-Chloro-1-propene
1-Chloro-2,3-epoxypropane
1-Chloro-2-cyanoethane
1-Chloro-2-nitrobenzene
1-Chloro-4-methylbenzene
10-Chloro-5,10-dihydrophenarsazine (DM)
Chloroacetaldehyde
2-Chloroacetaldehyde
Chloroacetaldehyde monomer
Chloroacetaphenone
Chloroacetic acid

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Chloroacetic acid chloride
Chloroacetic acid, ethyl ester
Chloroacetic acid, methyl ester
Chloroacetic chloride
Chloroacetone, stabilized
Chloroacetonitrile
Chloroacetyl chloride
2-Chloroacrylic acid, methyl ester
Chloroaldehyde
Chlorobenzene
Chlorobenzilate
2-Chlorobuta -1,3-diene
Chlorobutadiene
Chlorobutane
1-Chlorobutane
2-Chlorobutane
Chlorocarbonic acid, ethyl ester
Chlorocyan
Chlorocyanogen
Chlorodibromomethane
Chlorodifluoromethane
Chloroethanal
2-Chloroethanal
Chloroethane
Chloroethane
2-Chloroethane sulfonyl chloride
Chloroethanenitrile
Chloroethanol
2-Chloroethanol
Chloroethene
2-Chloroethyl chlorocarbonate
2-Chloroethyl vinyl ether
Chloroethylene
Chloroform
Chloroformate
Chloroformic acid, isopropyl ester
Chloroformyl chloride
Chlorohydrins
Chloromethane
Chloromethyl (Chloromethyl) benzene
Chloromethyl cyanide
Chloromethyl ether
Chloromethyl ethyl ether
Chloromethyl methyl ether
1-(Chloromethyl)-4-nitrobenzene
Chloromethyloxirane
2-Chloronaphthalene
Chloronitrobenzene
Chlorophenyl methane
4-Chlorophenyl phenyl ether

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2-Chlorophenylthiourea
Chloropicrin
Chloropicrin: methyl chloride
Chloropivaloyl chloride
Chloroprene
1-Chloropropane

2-Chloropropane
3-Chloropropanenitrile
Chloropropene
2-Chloropropene
3-Chloropropene
Chloropropham
2-Chloropropionic acid
3-Chloropropionitrile
3-Chloropropyl octyl sulfoxide
Chloropropylene
1-Chloropropylene
Chloropropylene oxide
Chlorosulfane
Chlorosulfonic acid
Chlorosulfuric acid
Chlorothalonil
Chlorotoluene
3-Chlorotoluene
4-Chlorotoluene
Chlorotrifluoride
Chlorotrifluoroethane
Chlorotrifluoroethylene
Chlorotrifluoromethane
Chlorotrimethylsilane
Chlorovinylarsine dichloride
Chlorovinyldichloroarsine
Chloroxuron
Chlorpyrifos
Chlorthiophos
Chlorylen
Choline chloride carbamate
Cholroethyl
Chromic acetate
Chromic acid
Chromic anhydride
Chromic sulfate
Chromium (dust)
Chromium oxychloride
Chromous chloride
Chrysene
Cinnamenol
cis-Butene
Citric acid
Citrus red No 2

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CK
Clorox
CN
CO
Coal gas
Coal naphtha
Coal oil
Cobalt
Cobalt acetate
Cobalt bromide
Cobalt carbonyl
Cobalt chloride

Cobalt fluoride
Cobalt formate
Cobalt nitrate
Cobalt sulfamate
Cobalt sulfate
Cocculus
Coconut oil: edible
Colchicine
Collodion
compressed gas
Copper
Copper acetate
Copper acetoarsenite
Copper arsenite
Copper bromide
Copper chloride
Copper cyanide
Copper fluoroborate
Copper formate
Copper glycinate
Copper iodide
Copper lactate
Copper naphthenate
Copper nitrate
Copper oxalate
Copper subacetate
Copper sulfate
Copper sulfate, ammoniated
Copper tartrate
Coumaphos
Coumatetralyl
1,3-CPD
CR (Dibenzo (b,f)-1,4-oxazepine)
Creosote, coal tar
Cresols
Cresyl glycidyl ether
Cresylate spent caustic solution
Crimidine

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Croton oil
Crotonal
Crotonaldehyde
Crotonaldehyde (E)
Crude oil
CS
CTFETrifluorovinyl chloride
Cumene
Cumene hydroperoxide
Cumyl hydroperoxide
Cupferron
Cupriethylene diamine solution
Curmol
Cyanazine
2-Cyano-2-propanol
Cyanoacetic acid
Cyanoacetonitrile
Cyanobenzene

Cyanobromide
Cyanoethane
2-Cyanoethyl alcohol
Cyanoethylene
Cyanogen
Cyanogen bromide
Cyanogen chloride
Cyanogen iodide
Cyanogen monoiodide
2-Cyanohydrin
Cyanomethane
Cyanomethanol
2-Cyanopropane
Cyanotoluene
2-Cyanpropene
Cyanuric chloride
Cycasin
Cyclobutane
Cycloheptane
Cycloheptatriene
Cycloheptene
1,4-Cyclohexadiene dioxide
Cyclohexane
Cyclohexanol
Cyclohexanone
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cyclopentadienyl manganese
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Copper subacetate
Copper sulfate
Copper sulfate, ammoniated
Copper tartrate
Coumaphos
Coumatetralyl
1,3-CPD
CR (Dibenzo (b,f)-1,4-oxazepine)
Creosote, coal tar

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Cresols
Cresyl glycidyl ether
Cresylate spent caustic solution
Crimidine
Croton oil
Crotonal
Crotonaldehyde
Crotonaldehyde (E)
Crude oil
CS
CTFETrifluorovinyl chloride
Cumene
Cumene hydroperoxide
Cumyl hydroperoxide
Cupferron
Cupriethylene diamine solution
Curmol
Cyanazine
2-Cyano-2-propanol
Cyanoacetic acid
Cyanoacetonitrile
Cyanobenzene
Cyanobromide
Cyanoethane
2-Cyanoethyl alcohol
Cyanoethylene
Cyanogen
Cyanogen bromide
Cyanogen chloride
Cyanogen iodide
Cyanogen monoiodide
2-Cyanohydrin
Cyanomethane
Cyanomethanol
2-Cyanopropane
Cyanotoluene
2-Cyanpropene
Cyanuric chloride
Cycasin
Cyclobutane
Cycloheptane
Cycloheptatriene
Cycloheptene
1,4-Cyclohexadiene dioxide
Cyclohexane
Cyclohexanol
Cyclohexanone

Cyclohexanone peroxide
Cyclohexatriene
Cyclohexene

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Cyclohexenyl trichlorosilane
Cycloheximide
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Cyclohexyl isocyanate
Cyclohexylamine
Cyclohexylketone
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cyclopentadienyl manganese
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Cyclopentene
Cyclopentimine
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Diamine
Diamine hydrate
Diamine sulfate
2,2'-Diaminodiethylamine
4,4'-Diaminodiphenyl ether
1,2- Diaminoethane
Diaminotoluene

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Diaminotoluene (mixed isomers)
2,4-Diaminotoluene
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Diammonium sulfide
Diammonium sulfite
Diatol
Diazan
Diazinon
Diazomethane
Dibenzo (A,E) pyrene
Dibenzo (A,H) anthracene
Dibenzo (A,H) pyrene
Dibenzo (A,I) pyrene
Dibenzo (A,J) acridine
Dibenzo (A,L) pyrene
Dibenzo (b,f)-1,4-oxazepine (CR)
7H-Dibenzo (C,G) carbazole
Dibenzofuran
Dibenzoyl peroxide
Dibenzyl ether
DIBORANE
Diboron hexahydride
1,2-Dibromo-3-chloropropane
Dibromoethane
1,2-Dibromoethane
Dibromomethane
Dibutyl phenol
Dibutyl phthalate
Dicamba
Dichlobenil
Dichlone
Dichloricide
Dichloro (2-chlorovinyl) arsine
Dichloro-1,2-propane
1,4-Dichloro-2-butene
1,3-Dichloro-2-propanone
Dichloroacetic acid
Dichloroacetic acid, methyl ester
1,3-Dichloroacetone
Dichloroacetyl chloride
Dichloroacetylene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidine
Dichlorobromomethane
Dichlorobutene
1,4-Dichlorobutene
2,2'-Dichlorodiethyl ether

Dichlorodifluoromethane
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1,1-Dichloroethane
1,2-Dichloroethane
Dichloroether
Dichloroethylarsine
1,1-Dichloroethylene
1,2-Dichloroethylene
Dichloroethylphenylsilane
Dichloroethylsilane
2,2-Dichloroisopropyl ether
Dichloromethane
Dichloromethyl benzene
Dichloromethyl ether
Dichloromethylphenylsilane
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Dichloromonofluoromethane
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Dichlorophenoxyacetic acid
2,4-Dichlorophenoxyacetic acid
Dichlorophenoxyacetic esters
Dichlorophenyl
Dichlorophenyl phosphine
Dichlorophenylarsine
1,2-Dichloropropane
Dichloropropene
1,3-Dichloropropene
2,3-Dichloropropene
Dichloropropionic acid
Dichloropropylene
Dichlorosilane
Dichlorosilicone
Dichlorosulfane
Dichlorotetrafluoroethane
1,2'-Dichlorotriethylamine
2,2'-Dichlorotriethylamine
Dichlorvos
Dicofol
Dicrotophos
Dicyan
1,4-Dicyanobutane
Dicyanogen
Dicyanomethane
Dicyclopentadiene
Dieldrin
Diepoxybutane
1,2,3,4-Diepoxybutane
Diesel
Diesel fuel
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1,2-Diethoxyethane
Diethyl
2,6-Diethyl aniline
Diethyl benzene
Diethyl carbamazine citrate
Diethyl carbonate
Diethyl cellosolve
Diethyl chlorophosphate
Diethyl ether
Diethyl ethylphosphate
Diethyl glycol
Diethyl oxide
Diethyl phthalate
Diethyl p-nitrophenyl thiophosphate
Diethyl stilbestrol
Diethyl sulfate
Diethyl sulfide
Diethyl zinc
Diethylaluminum chloride (DEA)
Diethylaluminum hydride
Diethylamine
Diethylamino (Diethylamino) ethane
Diethylaminoethanol
2-Diethylaminoethanol
Diethylene ether
Diethylene glycol
Diethylene glycol dibutyl ether
Diethylene glycol dimethyl ether
Diethylene glycol monobutyl ether
Diethylene glycol monobutyl ether acetate
Diethylene glycol monoethyl ether
Diethylene glycol monomethyl ether
Diethylene oxide
Diethylene oxide
Diethylene oximide
1,4-Diethylenedioxide
Diethylenetriamine
Diethylenimide oxide
Diethylethanolamine
1,2-Diethylhydrazine
Diethylketone
Diethylphosphate
3,3'-Diethylthiadicarbocyanine iodide
Difluorine
Difluorine monoxide
Difluorochloromethane
Difluorodichloromethane
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1,1-Difluoroethylene
Difluorophosphoric acid
Diglycidyl ether
Diheptyl phthalate
Dihydrogen dioxide
Dihydrogen selenide

Dihydrooxirene
2,3-Dihydropyran
1,4-Dihydroxy-2-butyne
Diisobutyl amine
Diisobutyl carbinol
Diisobutyl ketone
Diisobutyl pthalate
Diisobutylene
Diisodecyl phthalate
Diisononyl phthalate
Diisooctyl phthalate
Diisopropanol amine
Diisopropyl benzene (all isomers)
Diisopropyl benzene hydroperoxide
Diisopropyl ether
Diisopropylamine
Diketene
Dimefox
Dimethoate
1,2-Dimethoxyethane
Dimethyl
Dimethyl adipate
4-Dimethyl aminoazobenzene
Dimethyl aminobenzene
dimethyl carbamate
Dimethyl carbonate
Dimethyl cellosolve
Dimethyl ether
1,1 Dimethyl ethylamine
Dimethyl ethylphosphonate
Dimethyl glutarate
Dimethyl hydrogen phosphite
Dimethyl ketone
Dimethyl mercury
Dimethyl monosulfide
2,2-Dimethyl octanoic acid
Dimethyl phenylamine
Dimethyl phthalate
Dimethyl polysiloxane
Dimethyl succinate
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Dimethyl tetracholorterephthalate
Dimethyl thiophosphoryl chloride
Dimethyl zinc
Dimethylacetamide
Dimethylacetone
Dimethylamide acetate
Dimethylamidoethoxyphosphoryl cyanide
Dimethylamine
Dimethylamine, solution
2-Dimethylaminoethanol
Dimethylanaline
1,2-Dimethylbenzene

1,3-Dimethylbenzene
1,4-Dimethylbenzene
Dimethylbenzyl hydroperoxide
2,2-Dimethylbutane
Dimethylcarbamic chloride
Dimethylcarbamoyl chloride
Dimethylcarbinol
Dimethyldichlorosilane
Dimethylene diamine
Dimethylene oxide
Dimethylenimine
1,1-Dimethylethane
Dimethylethanolamine
1,1-Dimethylethyl hydroperoxide
Dimethylformamide
Dimethylhexane dihydroperoxide
1,1-Dimethylhydrazine
Dimethylmethane
2,4-Dimethylphenol
Dimethylphosphoro chloridothioate
Dimethyl-p-nitrophenyl thiophosphate
2,2-Dimethylpropane
2,2-Dimethylpropane-1,3-diol
Dimetilan
Di-n-amyl phthalate
Di-n-amylamine
Di-n-butyl ether
Di-n-butyl ketone
Di-n-butyl phthalate
Di-n-butylamine
2,4-Dinitro-1-aminobenzamine
2,4-Dinitroaniline
2,4-Dinitrobenzamine
1,2-Dinitrobenzene
1,3-Dinitrobenzene
1,4-Dinitrobenzene
Dinitrobenzenes
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Dinitrogen tetroxide
2,4-Dinitro-o-cresol
4,6-Dinitro-o-cyclohexyl phenol
Dinitrophenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
Di-n-octyl phthalate
Dinofan
Dinonyl phthalate
Dinoterb
Di-n-propylamine
Dioctyl adipate
Dioctyl phthalate
Dioctyl sodium sulfosuccinate
Dioform
1,4-Dioxane

Dioxathion
Dioxygen
DIPA
Dipentene
Diphacinone
Diphenamide
Diphenyl
Diphenyl ether
Diphenylamine
Diphenylamine chloroarsine
Diphenyldichlorosilane
Diphenylmethane diisocyanate
Diphosgene
Diphosphorus pentasulfide
Dipotassium persulfate
Diproanoate
Dipropylamine
Dipropylene glycol
Dipropylene glycol dibenzoate
Dipropylene glycol methyl ether
Diquat
Direct black 38
Direct blue 6
Direct brown 95
Distilled mustard
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Disulfur dichloride
Disulfuric acid
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Dithane A-4
Dithiabutane
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Dithiobiuret
Ditridecyl phthalate
Diundecyl phthalate
Diuron
Divinyl
Divinylene Oxide
DM (10-Chloro-5,10-dihydrophenarsazine
DMA
DMA
DMAC
DMCC
DMF
DMFA
DMH
DMPD
DMS
DMSO
DNA
DNBP
2,4-DNP
Dodecanol
Dodecene
Dodecyl diphenyl ether disulfonate
Dodecyl methacrylate

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Ethenylbenzene
Ether
Ether
Etherin
Ethienocarb
Ethine
Ethinylcarbinol
Ethinylestradiol
Ethion

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1,2-Ethlyene dichloride
Ethoprophos
Ethoxy triglycol
Ethoxydihydropyran
2-Ethoxyethanol
2-Ethoxyethyl ethyl ether
Ethoxyethylbenzene
Ethoxylated dodecanol
Ethoxylated nonylphenol
Ethoxylated pentadecanol
Ethoxylated tetradecanol
Ethoxylated tridecanol
Ethyl 2-propenoate
Ethyl acetate
Ethyl acetoacetate
Ethyl acrylate
Ethyl alcohol
Ethyl aluminum dichloride
Ethyl aluminum sesquichloride
Ethyl amyl ketone
Ethyl azinphos
Ethyl bromide
Ethyl bromoacetate
Ethyl butanoate
Ethyl butanol
Ethyl butyl ether
Ethyl butyrate
Ethyl carbamate
Ethyl carbonate
Ethyl cellosolve
Ethyl chloride
Ethyl chlorocarbonate
Ethyl chloroformate
Ethyl chloromethanoate
Ethyl chlorothioformate
Ethyl cyanide
Ethyl cyclohexane
Ethyl dichlorosilane
Ethyl ethanoate
Ethyl ether
Ethyl formate
Ethyl glycol
Ethyl glyme
Ethyl hexaldehyde
2-Ethyl hexanoic acid
2-Ethyl hexanol
Ethyl hexyl tallate

2-Ethyl hexylamine
Ethyl hydrosulfide
Ethyl ketone

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Ethyl lactate
Ethyl mercaptan
Ethyl methacrylate
Ethyl methane sulfonate
Ethyl methanoate
Ethyl methyl ether
Ethyl methyl ketone
Ethyl monochloroacetate
Ethyl N,N’-dimethylphosphoramidocyanidate
Ethyl nitrate
Ethyl nitrile
Ethyl oxide
Ethyl phenol
Ethyl phosphonothioic dichloride
Ethyl phosphorodichloridate
Ethyl pirimifos
Ethyl propenoate
Ethyl rhodanate
Ethyl silicate
Ethyl sulfate
Ethyl sulfhydrate
Ethyl sulfocyanate
Ethyl t-butyl ether
Ethyl thiocyanate
Ethyl vinyl ether
Ethyl-3-ethoxypropionate
2-Ethyl-3-propyl acrolein
Ethylacetylene
Ethylaldehyde
Ethylamine
Ethylbenzene
Ethyl-bis-
Ethylbutylamine
Ethyldichloroarsine
Ethylene
Ethylene bromide
Ethylene carboxylic acid
Ethylene chloride
Ethylene chlorohydrin
Ethylene cyanohydrin
Ethylene dibromide
Ethylene dichloride
Ethylene dichloride
Ethylene fluoride
Ethylene fluorohydrin
Ethylene glycol
Ethylene glycol acetate
Ethylene glycol diacetate
Ethylene glycol diethyl
Ethylene glycol dimethyl ether

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Fluoroethylene
Fluorophosgene
Fluorosilicic acid
Fluorosulfonic acid
Fluorosulfuric acid
4-Fluorotoluene
Fluosilicic acid
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Forane 22B
Formaldehyde
Formaldehyde cyanohydrin
Formalin
Formamide
Formetanate hydrochloride
Formic acid
Formic acid isopropyl ester
Formic acid, ethyl ester
Formic acid, methyl ester
Formic ether
Formothion
Formparanate
Formyl hydrazino-4-(5-nitro-2-furyl)thiazole
Formyl trichloride
2-Formylfuran
Formylic acid
Fosthietan
Fostox
Fosvex
Freon 10
Freon 12
Freon 150
Freon 152
Freon 20
Freon 22
Freon 40
Fuberidazole
Fuel oil #1
Fuel oil #2
Fuel oil, No. 2
Fumaric acid
Fumette
Fuming sulfuric acid
Furadan
Furadan 3G
Furaldehyde
2-Furaldehyde
Furan
Furfural
2-Furfural
Furfuryl alcohol
Furodan
Fusel oil

GA
GAA

Gallic acid
Gallium metal
Gallium trichloride
Gasoline

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GD
GDME
Gelan I
Germane
Gettysolve B
Glacial acetic acid
Glacial acrylic acid
Glutaraldehyde solution
Glycerine
Glycerol trinitrate
Glycidaldehyde
Glycidyl methacrylate
Glycinol
Glycol cyanohydrin
Glycol dimethyl ether
Glycol methyl ether
Glycolonitrile
Glyconitrile
Glyme
Glyme-1
Glyoxal
Gly-oxide
Glyphosate
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Grasex

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Hexamethylene tetramine
Hexamethylenediamine
Hexamethyleneimine
Hexane
Hexanedinitrile
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1-Hexanol
Hexanon

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2-Hexanone
Hexene
1-Hexene
2-Hexene
3-Hexene
Hexone
Hexyl acetate
Hexylene
Hexylene glycol
HF
HN1
HN1 (N-Ethyl-2-2’di(chloroethyl) amine
HN2
HN3
Hydracrylonitrile
Hydrazine
Hydrazine hydrate
Hydrazine hydrogen sulfate
Hydrazine monosulfate
Hydrazine sulfate
Hydrazinium sulfate
Hydrazoic acid, sodium salt
Hydrazomethane
Hydrochloric acid
Hydrochloric ether
Hydrocyanic acid
Hydrocyanic acid solution
Hydrocyanic acid, sodium salt
Hydrofluoric acid
Hydrofluoric acid
Hydrofuran
Hydrogen
Hydrogen arsenic
Hydrogen bromide
Hydrogen bromide, anhydrous
Hydrogen carboxylic acid
Hydrogen chloride
Hydrogen chloride solution
Hydrogen cyanide
Hydrogen dioxide
Hydrogen fluoride
Hydrogen fluoride, solution
Hydrogen hexafluorosilicate
Hydrogen iodide, anhydrous
Hydrogen nitrate
Hydrogen oxide
Hydrogen peroxide

Hydrogen peroxide (35% solution)
Hydrogen phosphide
Hydrogen selenide

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Hydrogen sulfate
Hydrogen sulfide
2-Hydroperoxy-2-methylpropene
Hydroquinone
Hydrosulfuric acid
3-Hydroxy-1-propyne
Hydroxyacetonitrile
Hydroxybenzene
2-Hydroxyethyl acrylate
2-Hydroxyisobutyronitrile
Hydroxylamine
Hydroxylamine sulfate
Hydroxypropinonitrile
2-Hydroxypropinonitrile
3-Hydroxypropionitrile
Hydroxypropyl acrylate
Hydroxypropyl methacrylate
2-Hydroxypropylamine
2-Hydroxytriethylamine
Hypochlorite
Hyponitrous ether

Indeno(1,2,3-CD)pyrene
Inerton DW-DMC
Inerton-DMCS
Iodine cyanide
Iodomethane
Iron (powder)
Iron carbonyl
Iron pentacarbonyl
Isobenzan
Isobutane
Isobutanol
Isobutenyl methyl ketone
Isobutyl aldehyde
Isobutyl formate
Isobutyl methyl carbinol
Isobutyl methyl ketone
Isobutylamine
Isobutylene
Isobutylethene
Isobutyric acid
Isobutyronitrile
Isocumene
Isocyanatoethane
Isocyanic acid, ethyl ester
Isocyanic acid, methyl ester
1-Isocyanobutane
Isodecaldehyde
Isodrin
Isofluorphate

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Lentin
Leptophos
Lewisite
Li
Lindane
Linseed oil, boiled
Linseed oil, raw
Liquefied natural gas
Liquefied petroleum gas
Liquid chlorine

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Liquid oxygen
Litharge
Lithium
Lithium aluminum hydride
Lithium bichromate
Lithium borohydride
Lithium chromate
Lithium hydride
Lithium metal
LNG
Lorsban
LOX
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Luprisol
Lye

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Mercuric oxide
Mercuric sulfate
Mercuric sulfide
Mercuric thiocyanate
Mercurous acetate
Mercurous chloride
Mercurous nitrate

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Mercury
Mercury fulminate (wetted >20% water)
Mercury oxide
Mesityl oxide
Mestranol
Mesyl chloride
Metaldehyde
Metaphos
meta-Xylene
Methacetone
Methacrolein diacetate
Methacrylaldehyde
Methacrylic acid
Methacrylic acid chloride
Methacrylic anhydride
Methacrylonitrile
Methacryloyl chloride
Methacryloyloxyethyl isocyanate
Methaldehyde
Methallyl chloride
Methamidophos
Methanal
Methane
Methane carboxylic acid
Methane sulfuryl chloride
Methane trichloride
Methanearsonic acid, sodium salt
Methanecarbonitrile
Methanephosphonyl chloride
Methanesulfonic acid chloride
Methanesulfonyl
Methanesulfonyl chloride
Methanethiol
Methanoic acid
Methanol
Methiocarb
Methomyl
2-Methoxy-2-methylpropane
3-Methoxybutyl acetate
Methoxycarbonylethylene
Methoxychlor
2-Methoxyethanol
Methoxyethyl mercuric acetate
Methoxyethylene
1-Methoxyethylene
Methoxymethyl isocyanate
Methyl 2-benzimidazole carbamate
Methyl 2-chloroacrylate

Methyl 2-chloropropenoate
Methyl 2-methyl-2-propenoate

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Methyl acetate
Methyl acetic acid
Methyl acetic ester
Methyl acetoacetate
Methyl acetone 505 Methyl acetylene
Methyl acetylene-allene mixture
Methyl acrylate
Methyl acrylonitrile
Methyl alcohol
Methyl amyl acetate
Methyl amyl alcohol
Methyl amyl ketone
Methyl azinphos
Methyl azoxymethanol acetate
Methyl benzoate
Methyl bromide
Methyl butenol
Methyl butyl ketone
Methyl butyrate
Methyl cellosolve
Methyl chloride
Methyl chloroacetate
Methyl chloroformate
Methyl chloromethyl ether
Methyl cyanide
Methyl cyclohexanone
Methyl cyclopentadiene dimer
Methyl cyclopentadienyl manganese
Methyl dichloroacetate
Methyl dichloroarsine
Methyl dichloroethanoate
Methyl disulfide
Methyl ether
1-Methyl ethyl alcohol
Methyl ethyl ketone
Methyl ethyl pyridine
3-(1-Methyl ethyl) phenyl methyl carbamate
Methyl fluoroacetate
Methyl fluorosulfate
Methyl formal
Methyl formate
Methyl heptyl ketone
Methyl hydride
Methyl hydroxide
Methyl iodide
Methyl isobutenyl ketone
Methyl isobutyl carbinol
Methyl isobutyl ketone
Methyl isocyanate

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Methyl isopropenyl ketone
Methyl isopropyl ketone

Methyl isothiocyanate
Methyl ketone
2-Methyl lactonitrile
Methyl mercaptan
Methyl mercaptopropionaldehyde
Methyl mercuric dicyanamide
Methyl mercury
Methyl methacrylate
Methyl methane sulfonate
Methyl methanoate
Methyl monochloroacetate
Methyl mustard
1-Methyl naphthalene
Methyl nitrite
3-Methyl nitrosoaminopropionitrile
Methyl orthosilicate
Methyl oxide
Methyl parathion
Methyl PCT
Methyl pentyl ketone
Methyl phenkapton
Methyl phosphonic dichloride
Methyl phosphonothioic dichloride
Methyl phosphonous dichloride
Methyl phosphorous dichloride
Methyl propenoate
Methyl propionate
Methyl propyl ether
Methyl propyl ketone
1-Methyl pyrrolidone
Methyl rhodanate
Methyl salicylate
Methyl styrene
Methyl sulfate
Methyl sulfhydrate
Methyl sulfide
Methyl sulfocyanate
Methyl tert-butyl ether
Methyl thiocyanate
Methyl trichloroacetate
Methyl vinyl ether
Methyl vinyl ketone
Methyl zinc
2-Methyl-1,3-butadiene
2-Methyl-1-butene
3-Methyl-1-butene
2-Methyl-1-butenone
2-Methyl-1-nitroanthraquinone

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2-Methyl-1-pentene
4-Methyl-1-pentene
1-Methyl-1-phenylethene
1-Methyl-2-aminoethanol
3-Methyl-2-butanone
2-Methyl-2-butene
2-Methyl-2-hydroxy-3-butyne
4-Methyl-2-pentanol

2-Methyl-2-pentene
4-Methyl-2-pentene
2-Methyl-2-propenoic acid
3-Methyl-3-butene-2-one
4-Methyl-3-penten-2-one
2-Methyl-4-pentanone
2-Methyl-5-vinyl pyridine (MVP)
2-Methyl-6-ethyl aniline
Methylacryl chloride
2-Methylacrylic acid, methyl ester
Methylaldehyde
Methylamine
Methylamine
Methylaziridine
Methylbenzene
Methylbenzol
1-Methylbutadiene
2-Methylbutadiene
3-Methylbutan-2-one
Methylcarbinol
Methylcarbylamine
Methylchloroform
Methylcyclohexane
Methylcyclopentane
Methyldichlorosilane
Methylene
4-Methylene
Methylene acetone
Methylene bichloride
Methylene bromide
Methylene chloride
Methylene cyanide
Methylene cyanohydrin
4,4'-Methylene dianiline
Methylene dibromide
Methylene dichloride
Methylene diisocyanate
Methylene Oxide
4,4'-Methylene-bis-(2-chloroaniline)
4,4'-Methylene-bis-(2-methyaniline)
Methylene-bis-(phenylilsocyanate) (or MBI)
Methylethylamine

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1-Methylethylamine
Methylethylene
Methylhydrazine
1-Methylhydrazine
Methylmethane
Methyl-n-butanoate
Methyl-n-butyrate
Methylol
Methyloxirane
Methylpentamethylene
Methylpentane
methylphosphonofluoridate
Methylphosphonothioic acid
Methylphosphonyl dichloride

Methylpiperidine
2-Methylpropane
2-Methylpropene
2-Methylpropenenitrile
Methyltetrahydrofuran
Methyltrichloro silane
Methyltrichloromethane
Metolachlor
Metolcarb
Mevinphos
Mexacarbate
MFA
MFB
MIBC
MIBK
MIBK
MIC
3-MIC
Michler’s ketone
MIK
Mineral naphtha
Mineral oil
Mineral spirits
Miostat
MIPK
Mirbane oil
Mirex
MIT
MITC
MMA
MMA
MME
MMH
MNBK
m-Nitrophenol
m-Nitrotoluene

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Molecular oxygen
Molten phosphorus
Molybdinum trioxide
Monoallylamine Monoallylamine
Monobutylamine
Monochlorethane
Monochlorobenzene
Monochloroethylene
Monochloromethane
Monochlorotetrafluoroethane
Monochlorotrifluoromethane
Monocrotaline
Monocrotophos
Monoethanolamine
Monoethylamine
Monoethyldichlorosilane
Monofluoroacetate
Monofluorobenzene
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Monoisopropanolamine

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n-Butyl isocyanate
n-Butyl mercaptan
n-Butyl methacrylate
n-Butylacrylate
n-Butylamine
n-Butylaniline
n-Butylchloride
n-Butylene
n-Butyric acid

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NCI-C54262
n-Decyl acrylate
n-Decyl alcohol
n-Decyl benzene
N-Dipropylamine
Neodecanoic acid
Neon
Neoprene
N-ethyl cyclohexylamine
N-ethyl-2,2'-di(chloroethyl) amine (HN1)
N-ethyl-2-2' di(chloroethyl) amine (HN1)
N-ethylaniline
N-ethylbutylamine
N-Formyldimethylamine
n-Heptane
n-Heptene
n-Hexaldehyde
n-Hexane
Nickel
Nickel acetate
Nickel ammonium sulfate
Nickel bromide
NICKEL CARBONYL
Nickel chloride
Nickel cyanide
Nickel fluoroborate
Nickel formate
Nickel hydroxide
Nickel nitrate
Nickel subsulfide
Nickel sulfate
Nickel tetracarbonyl
Nicotine
Nicotine sulfate
Nitrador
Nitralin
Nitric acid
Nitric oxide
Nitrilotriacetic acid
Nitrilotriacetic acid, disodium salt
Nitrilotriacetic acid, sodium salt
Nitrilotriacetic acid, trisodium salt
5-Nitroacenaphthene
4-Nitroaniline
Nitrobenzene
Nitrobenzol
4-Nitrobiphenyl

Nitrocarbol
Nitrocellulose (with >25% water)
Nitrocellulose (with plasticizer >18%)

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Nitrochlorobenzene
Nitrochloroform
Nitrocresols
Nitrocyclohexane
Nitroethane
Nitrofan
Nitrofen
Nitrogen
Nitrogen chloride oxide
Nitrogen dioxide
Nitrogen gas
Nitrogen liquid
Nitrogen monoxide
Nitrogen mustard
Nitrogen mustard
Nitrogen mustard hydrochloride
Nitrogen mustard N-oxide
Nitrogen mustard N-oxide hydrochloride
Nitrogen oxide
Nitrogen oxide
Nitrogen oxide
Nitrogen oxychloride
Nitrogen tetroxide
Nitrogen trifluoride
Nitroglycerin
Nitromethane
Nitro-o-anisidine 5-Nitro-o-anisidine
Nitrophen
2-Nitrophenol
3-Nitrophenol
4-Nitrophenol
Nitropropane
1-Nitropropane
2-Nitropropane
4-Nitropyridine-1-oxide
Nitro-Sil
Nitrostarch (dry or wetted with <20% water)
Nitrostarch (wetted with >20% water)
Nitrosyl chloride
Nitrosylsulfuric acid
2-Nitrotoluene
2-Nitrotoluene
3-Nitrotoluene
4-Nitrotoluene
4-Nitrotoluene
Nitrotoluenes
3-Nitrotoluol
Nitrous acid, ethyl ester
Nitrous oxide
N-methyl aniline

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N-methyl-2,2'-di(chloroethyl) amine
N-methyl-methanamine
N-N’-bis(2-aminoethyl)-1,2-ethanediamine
N-nitrosodiethanolamine
N-nitrosodiethylamine
N-nitrosodimethylamine
N-nitrosodi-n-butylamine
N-nitrosodi-n-propylamine
N-nitrosodiphenylamine
N-nitrosomethylethylamine
N-nitrosomethylvinylamine
N-nitrosomorpholine
N-nitroso-N-ethyl urea
N-nitroso-N-methyl urea
N-nitroso-N-methyl urethane
N-nitrosonornicotine
N-nitrosopiperidine
N-nitrosopyrrolidine
N-nitrososarcosine
NO
n-Octane
Nonane
Nonanol
Nonene
Nonylphenol
Norbormide
Norethisterone
n-Pentane
N-phenylthiourea
N-phosphonomethylglycine
n-Propyl benzene
n-Propyl chloroformate
n-Propyl mercaptan
n-Propyl nitrate
n-Undecylbenzene

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Oxane
2-H-1,4-oxazine
Oxetanone
2-Oxetanone
Oxides of nitrogen
Oxidoethane
Oxirane

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Oxyacyclopropane
Oxybenzene
Oxydisulfoton
Oxygen
Oxygen difluoride
Oxymethylene
Ozone

Paint thinner
Paint, latex
Paint, oil base
p-Aminopyridine
Panfuran S
p-Anisidine
Paradichlorobenzene
Paraformaldehyde
Paraldehyde
Paramoth
Paraquat
Paraquat methosulfate
Parathion
Parathion
para-Xylene
Parazene
Paris green
p-Benzoquinone
PCE
p-Chloroaniline
p-Chloro-m-cresol
p-Chloronitrobenzene
p-Chloro-o-toluidine
p-Chlorotoluene
PCP
p-Cresidine
p-Cymene
PDB
p-Dichlorobenzene
p-Dinitrobenzene
p-Dioxane
Pentaborane monohydride
Pentacarbonyliron
1,2,3,7,8-Pentachlorodibenzofurans
Pentachlorodibenzo-p-dioxins
Pentachloroethane
Pentachlorophenate, sodium
Pentachlorophenol
Pentadecanol

Pentadecylamine
1,3-Pentadiene
Pentadione
2,4-Pentadione

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Pentaerythritol
Pentaerythritol tetranitrate (PETN)
Pentamethylene
Pentan-2,4-dione
Pentanoic acid
1-Pentanol
3-Pentanone
1-Pentene
2-Pentene
1-Pentyl alcohol
Pentyltrichlorosilane
Pepper spray
Peracetic acid
PERC
Percarbamide
Perchlor
Perchloric acid (50 to 72%)
Perchloroethylene
Perchloromethyl mercaptan
Perchloryl fluoride
Perclene
Perfluoroethylene
PETN (Pentaerythritol tetranitrate)
Petrol
Petrolatum
Petroleum
Petroleum distillate
Petroleum ether
Petroleum gas, liquefied
Petroleum naphtha
Petroleum naphtha
Petroleum solvent
Phenanthrene
Phenic acid
Phenol
Phenol trinitrate
Phenyl alcohol
Phenyl chloride
Phenyl fluoride
Phenyl isocyanate
Phenyl mercaptan
Phenyl phosphorous dichloride
Phenyl phosphorous thiodichloride
Phenyl silatrane
Phenyl trichloromethane
1-Phenyl-2-thiourea
Phenylacetonitrile
Phenylamine
Phenylarsine dichloride
Phenylcarboxyamide

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Phenylcarbylamine chloride
Phenylcyanide
Phenyldichloroarsine
Phenylenediamine
Phenylethane
Phenylethylene
Phenylhydrazine hydrochloride
Phenylic acid
Phenylmercuric acetate
Phenylmethane
2-Phenyloxirane
Phenylphosphine dichloride
1-Phenylpropane
2-Phenylpropane
2-Phenylpropylene
Phenylthiocarbamide
Phenylthiourea
Phorate
Phosacetim
Phosfolan
Phosgen
Phosgene
Phosmet
Phosphamidon
Phosphine
Phosphoric acid
Phosphoric sulfide
Phosphorochloridothioic acid, O,O-dimethyl ester
Phosphorous hydride
Phosphorous trihydride
Phosphorus
Phosphorus (amorphous red)
Phosphorus (black)
Phosphorus bromide
Phosphorus chloride
Phosphorus chloride oxide
Phosphorus oxide trichloride
Phosphorus oxychloride
Phosphorus oxytrichloride
Phosphorus pentachloride
Phosphorus pentafluoride
Phosphorus pentasulfide
Phosphorus pentoxide
Phosphorus persulfide
Phosphorus tribromide
Phosphorus trichloride
Phosphoryl chloride
Phosporous trioxide
Phosvin
Phosvin

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Phthalic anhydride
Pic-chlor
Picfume
Picoline
Picral

Picric acid
Picride
Picrotoxin
Pimelic ketone
Pinacolyl alcohol
Pinacolyl methylphosphonofluoridate
Pine oil
Pinene
Piperazine
Piperidine
Piperylene
Piprotal
Platinum tetrachloride
PMFP
p-Nitrobenzene
p-Nitrophenol
p-Nitrotoluene
Polybrominated biphenyls
Polybutene
Polychlorinated biphenyls
Polyethylene polyamines
Polyphosphoric acid
Polypropylene
Polypropylene glycol
Polypropylene glycol methyl ether
Ponceau 3R
Potassium
Potassium arsenite
Potassium binoxalate
Potassium bromate
Potassium chlorate
Potassium chromate
Potassium cyanide
Potassium dichloro-s-triazinetrione
Potassium dichromate
Potassium fluoride
Potassium hydroxide
Potassium hydroxide solution
Potassium iodide
Potassium oxalate
Potassium permanganate
Potassium peroxide
Potassium peroxydisulfate
Potassium persulfate
Potassium silver cyanide

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Progesterone
Promecarb
Prometryne
Propadiene
Propadiene mixture
Propane
Propane sultone
1,2-Propanediol-1-methacrylate
Propanethiol
1-Propanethiol
Propanoic acid

2-Propanol
3-Propanolide
2-Propanone
Propargite
Propargyl bromide
Propellant 12
2-Propen-1-amine
2-Propenal
Propenamide
2-Propenamine
Propene
1-Propene
Propene acid
Propene oxide
Propene-3-yltrichlorosilane
Propenenitrile
2-Propenenitrile
Propenoic acid
2-Propenoic acid
Propenoic acid, ethyl ester
Propenoic acid, methyl ester
Propenol
2-Propenol
Propenoyl chloride
Propenyl alcohol
2-Propenyl bromide
Propenyl chloride
2-Propenyl chloroformate
Propiolactone
Propionaldehyde
Propionic acid
Propionic anhydride
Propionic nitrile
Propionitrile
Propoxur
Propyl acetate 1-Propyl acetate
Propyl bromide
Propyl chlorocarbonate
Propyl chloroformate

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2-Propyl chloroformate
Propyl cyanide
Propyl mercaptan
Propylacetone
Propylamine
2-Propylamine
Propylene
1-Propylene
Propylene butylene polymer
Propylene dichloride
Propylene glycol
Propylene glycol ethyl ether
Propylene glycol methyl ether
Propylene glycol monomethacrylate
Propylene oxide
Propylene tetramer
Propylene trimer

1,2-Propylenediamine
Propyleneimine
Propylnitrile
2-Propynol
Propynyl alcohol
Prothoate
Prozoin
Prussic acid
Prussite
PS
p-tert-Butyl phenol
p-Toluene sulfonic acid
p-Toluidin
p-Tolyl chloride
PTU
Pyrene
Pyrethrins
4-Pyridinamine
Pyridine
4-Pyridylamine
Pyriminil
Pyrogallic acid
Pyrophosphoric acid, tetraethyl ester
Pyrosulfuryl chloride
Pyrrolidine
2-Pyrrolidone

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Selenium trioxide
Selenium(powder)
Semicarbazide hydrochloride
Sewer gas
Sextone
Silane
Silica, crystalline
Silica, gel
Silicochloroform
Silicofluoric acid

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Silicon (powder)
Silicon chloride
Silicon dioxide (sand)
Silicon tetrachloride
Silver
Silver acetate
Silver carbonate
Silver iodate
Silver nitrate
Silver oxide
Silver sulfate
Silvex
Simazine
Sinox
Skellysolve A
Soda lye
Sodium
Sodium 2-mercaptobenzothiazol solution
Sodium alkyl sulfates
Sodium alkylbenzene sulfonates
Sodium amide
Sodium arsenate
Sodium arsenite
Sodium azide
Sodium bifluoride
Sodium bisulfite
Sodium borate
Sodium borohydride
Sodium borohydride (15% or less)
Sodium cacodylate
Sodium chlorate
Sodium chlorate solution
Sodium chromate
Sodium dichloro-s-triazinetrione
Sodium dichromate
Sodium ferrocyanide
Sodium fluoride
Sodium fluoroacetate
Sodium fluorosilicate
Sodium hydrate
Sodium hydride
Sodium hydrosulfide solution
Sodium hydroxide
Sodium hypochlorite
Sodium hypochlorite solution
Sodium methylate

Sodium nitrate
Sodium nitrite
Sodium oxalate
Sodium perchlorate

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Sodium persulfate
Sodium phosphate
Sodium phosphate, tribasic
Sodium phosphide
Sodium saccharin
sodium salt
Sodium selenate
Sodium selenite
Sodium silicate
Sodium sulfate
Sodium sulfide
Sodium sulfite
Sodium tellurite
Sodium thiocyanate
Solvent 111
Soman
Sorbitol
Spirits of turpentine
Stannous fluoride
Stearic acid
Sterigmatocystin
s-Tetrachloroethane
Stibine
Stoddard solvent
Strontium chromate
Strychnine
Strychnine sulfate
Styrene
Styrene monomer
Styrene oxide
Styrene-7,8-oxide
Styrol
Styrolene
Suberane
Sucrose
Sulfallate
Sulfan
Sulfinyl chloride
Sulfolane
Sulfolane-W
Sulfonyl chloride
Sulfotep
Sulfur
Sulfur anhydride
Sulfur chloride
Sulfur chloride oxide
Sulfur dioxide
Sulfur hydride
Sulfur monochloride
Sulfur mustard

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Sulfur oxide
Sulfur oxychloride
Sulfur pentafluoride
Sulfur phosphide
Sulfur subchloride
SULFUR TETRAFLUORIDE
Sulfur trioxide
Sulfureted hydrogen
Sulfuric acid
Sulfuric acid, dimethyl ester
Sulfuric acid, fuming
Sulfuric anhydride
Sulfuric chlorohydrin
Sulfuric oxide
Sulfuric oxychloride
Sulfurous acid
Sulfurous acid anhydride
Sulfurous acid, diammonium salt
Sulfurous anhydride
Sulfurous oxide
Sulfurous oxychloride
SULFURYL CHLORIDE
Supracide
Sweet spirit of nitre

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Tetrachloroethylene
Tetrachloromethane
Tetrachlorosilane
Tetrachlorotitanium
Tetrachlorvinphos
Tetradecanol
1-Tetradecene

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Tetradecyl benzene
Tetraethyl dithiopyrophosphate
Tetraethyl lead
Tetraethyl pyrophosphate
Tetraethyl tin
Tetraethylene glycol
Tetraethylene pentamine
Tetraethylplumbane
Tetrafluoroethylene
Tetrafluorohydrazine
Tetrafluoromethane
Tetrafluorosulfurane
Tetrahydro-1,4-oxazine
Tetrahydrofuran
Tetrahydronaphthalene
Tetrahydrothiophene-1
Tetramethyl lead
1,2,3,5-Tetramethylbenzene
Tetramethylene cyanide
Tetramethylene oxide
Tetramethylene sulfone
Tetramethylsilane
Tetran
Tetranitromethane
Tetrasol
Tetrodotoxin
Thallium
Thallium acetate
Thallium carbonate
Thallium nitrate
Thallium sulfate
Thallous carbonate
Thallous chloride
Thallous malonate
Thallous sulfate
THF
4-Thiapentanal
Thioacetamide
Thioacetic acid
Thiobencarb
Thiobutyl alcohol
Thiocarbamide
Thiocarbazide
Thiocyanic acid, ethyl ester
Thiocyanomethane
4,4'-Thiodianiline
Thiodiglycol

Thioethanol
Thioethylalcohol
Thiofanox

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Thiolane-1,1-dioxide
Thiomethyl alcohol
Thionazin
Thionyl chloride
Thiophan sulfone
Thiophenol
Thiophos
Thiophosgene
Thiophosphoric anhydride
2-Thiopropane
Thiosemicarbazide
Thiourea
Thiourea (2-chlorophenyl)
2-Thiourea
Thiram
Thorium dioxide
Thorium nitrate
TIBAL
Titanium (IV) chloride
Titanium chloride
Titanium dioxide
Titanium tetrachloride
TL 214
TL 69
TMA
TNM
TNT
Toluene
Toluene 2,4-diisocyanate
Toluene diamine
Toluene diisocyanate
Toluene-2,4-diamine
2,4-Toluenediamine
Toluidines
Toluol
Tolu-sol
1-(2-Tolyl)thiourea
Toxaphene
2,4,5-TP (or Silvex)
trans-2-Butenal
trans-Butene
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TRI
Triamiphos
Triaziquone
Triazofos
Tribromoborane
Tribromophosphine
Tributyl phosphate
Tributylamine

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tricarbonyl
Tricarbonyl methyl cyclopentadienyl manganese
Trichlor
Trichlorfon
Trichloro(chloromethyl)silane
1,1,2-Trichloro-1,2,2-trifluoroethane
Trichloroacetaldehyde
Trichloroacetic acid
Trichloroacetic acid chloride
Trichloroacetyl chloride
Trichloroallysilane
Trichloroamylsilane
Trichlorobenzene
1,2,4-Trichlorobenzene
Trichloroborane
Trichloroboron
Trichlorobutene
Trichlorobutylsilane
Trichloroethanal
1,1,1-Trichloroethane
Trichloroethene
Trichloroethyenylsilane
Trichloroethyl silicon
Trichloroethylene
Trichloroethylsilane
Trichlorofluoromethane
Trichloroform
Trichloromethane
Trichloromethylsilane
Trichloromethylsilicon
Trichloromonosilane
Trichloronate
Trichloronitromethane
2,4,6-Trichlorophenol
2-(2,4,5-Trichlorophenoxy)propanoic acid
2,4,5-Trichlorophenoxyacetic acid
2,4,5-Trichlorophenoxyacetic acid, sodium salt
Trichlorophenylsilane
Trichlorophosphine
1,2,3-Trichloropropane
Trichlorormethyl benzene
Trichlorortoluene
Trichlorosilane
Trichlorosilane
2,4,6-Trichloro-s-triazine
Trichloro-s-triazinetrione
2,2',2''-Trichlorotriethylamine
Trichlorotrifluoroethane
Trichlorovinylsilicon
Tri-clor

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Tridecane
Tridecanol
1-Tridecene
Tridecyl benzene
Trien
Triethane

Triethanol amine
triethanol amine salt
Triethoxysilane
Triethyl aluminum
Triethyl benzene
Triethyl phosphate
Triethyl phosphite
Triethylamine
Triethylene glycol
Triethylene thiophosphoramide
Triethylenetetramine
Trifluoro chloroethylene
Trifluoroacetic acid
Trifluoroboron
Trifluorochlorine
3-Trifluoromethylaniline
Trifluralin
Triisobutylalane
Triisobutylaluminum
Triisobutylene
Triisopropanol amine
Trilon 83
Trimethoxysilane
2,4,6-Trimethyl aniline
Trimethyl benzene
Trimethyl phosphite
Trimethyl tin chloride
Trimethylacetic acid
Trimethylacetyl chloride
Trimethylamine
Trimethylchlorosilane
Trimethylene
Trimethylhexamethylene diisocyanate
Trimethylhexamethylenediamine
Trimethylmethane
Trinitrobenzene
Trinitrobenzene(wetted with >30% water)
Trinitrobenzoic acid (wetted with >30% water)
Trinitrobenzoic acid wetted with >30% water)
Trinitroglycerin
Trinitrophenol
Trinitrotoluene
2,4,6-Trinitrotoluene
Tri-p-cresyl phosphate

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Triphenyl tin chloride
Tripropylene glycol
Tripropylene glycol methyl ether
Tris-(2,3-dibromopropyl) phosphate
Tris-(2-chloroethyl) amine
Tris(aziridinyl)phosphine oxide
Trithion
Trixylenyl phosphate
Trona
Trypan blue
TS 160
Turpentine

Turpentine oil
Turpentine spirits
TX 60
Aluminum, triisobutyl

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unsym-Dimethylhydrazine
Uracil mustard
Uranium hexafluoride
Uranium metal (pyrophoric)
Uranium peroxide
Uranyl acetate
Uranyl nitrate
Uranyl sulfate
Urea
Urea hydrogen peroxide
Urea peroxide
Urea-ammonium nitrate solution
Urethane
USAFST-40

VAC
Valeraldehyde
Valeric acid
VAM
Vanadium
Vanadium oxychloride
Vanadium oxytrichloride
Vanadium pentoxide
Vanadium trichloride oxide
Vanadyl sulfate
Vanadyl trichloride
Vapotone
VC
VCM
VDC
Vidden D
Vinyl A Monomer
Vinyl acetate
Vinyl acetylene
Vinyl allyl ether
Vinyl amide

Vinyl benzene
Vinyl bromide
Vinyl chloride
Vinyl chloride monomer
Vinyl cyanide
Vinyl ethyl ether
Vinyl fluoride
Vinyl formic acid
Vinyl isobutyl ether
Vinyl methyl ether
Vinyl methyl ketone
Vinyl neodecanoate
Vinyl toluene
Vinylcarbinol
Vinylethylene
Vinylidene chloride
Vinylsilicon trichloride
Vinyltrichlorosilane
Vorlex
Vulnoc AB
VX

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Weedone
White caustic
White phosphorus
Wood alcohol
Wood ether
Woodtreat

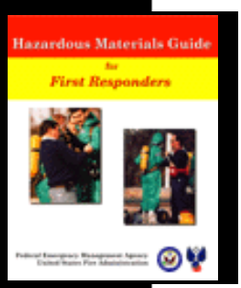
Xenon
Xylenes
Xylenol
2,6-Xylidine
Xylol

Yellow phosphorus
Yperite

2,5-z
Zectran
Zinc
Zinc acetate
Zinc ammonium chloride
Zinc arsenate
Zinc bichromate
Zinc borate
Zinc bromide
Zinc carbonate
Zinc chloride
Zinc chromate
Zinc cyanide
Zinc dialkyldithiophosphate
Zinc methyl
Zinc phosphide
ZP
ZP

Hazmat Guide

- General Incident Approach
- Chemical Pages
- Tank & Rail Car Silhouettes
- Glossary
- Contacts
- Order Guide



USFA Hazardous Materials Guide for First Responders
General Approach to a Hazmat Incident

Background
Training-specific Responses
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Regulatory Considerations

The **HAZWOPER** standard (29CFR 1910.120) requires an Incident Command System (ICS) as well as a Site Safety Plan and a Safety Officer. Remember, OSHA regulations are law while standards such as NFPA 471 and 472 are recommendations, which may or may not be adopted by a jurisdiction. Emergency services have been heavily fined for not following OSHA regulations. While there is no monetary fine for not following NFPA standards, failure to follow them may impose a liability.

The **Superfund Amendments and Reauthorization Act of 1986 (SARA)**, which required OSHA to create and implement the HAZWOPER standard, directs OSHA to protect all employees responding to emergencies without specifying their location. Section 126 (d)(4) of SARA states, "Standards shall set forth requirements for training of workers who are responsible for responding to hazardous emergency situations who may be exposed to toxic substances in carrying out their responsibilities."

First Responders such as fire departments, emergency medical services, and police departments, if they accept jurisdiction for hazardous materials incidents, are each normally required to have an **emergency response plan** which addresses personnel roles, lines of authority, training, and communication [29CFR 1910.120(q)(2)]. However, a community could have a comprehensive plan addressing these issues for all employees. The amount of training must be based on the duties and functions to be performed by each responder. To safely respond to a hazardous materials incident, an individual must be both trained and mentally prepared. **What you don't know can kill you.**

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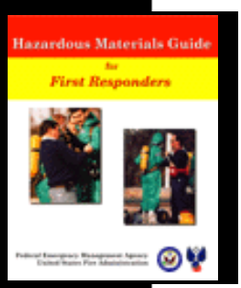

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Background

A Hazardous Material is any substance (gas, liquid, or solid) capable of causing harm to people, property, or the environment. There are thousands of different materials in use in the world today. Most are shipped as part of normal commerce. All substances in large enough amounts are poisonous to humans and all chemical exposures should be avoided. Some substances, even in very small quantities, may rapidly cause death. Except for materials known to cause cancer in humans, only acute health effects have been considered in this book. A Hazmat Incident involves the actual or potential unplanned/uncontrolled release of a hazardous material.

A First Responder is an individual who may arrive first on the scene of a Hazmat Incident with the responsibility to act, regardless of what agency they represent. A general response scheme for the initial phases of a response is shown on the outside of the back cover of this book. When approaching the scene, slow down and approach cautiously, from an uphill and upwind direction if possible. That is, move downhill with the wind at your back. Be alert for visible signs such as smoke, vapor clouds, fire, or the sound of explosions. Look for discoloration of grass or trees, dead birds, or other animals. Check flags, smokestacks or vapor clouds for wind direction. Dispatch should call the Weather Bureau for the current temperature, wind speed and humidity as well as the general forecast for the next several hours. Having this information while en route will assist in the initial assessment of the incident. Agencies must develop the capability to measure the wind speed and direction at the site of the incident for greater accuracy.

When setting up the command post and determining the evacuation sectors, keep in mind the possibility of shifting winds. Park vehicles pointed away from the scene to allow for a rapid exit if necessary. Keep the staging area a safe distance from the release area since vehicles can be an ignition source. By OSHA law you must limit the number of people in the Hot Zone.

The following sections provide some general information about Hazmat actions for those trained at the Awareness and Operational Levels. These individuals respond in a defensive fashion. Under OSHA 1910.120, both Awareness and Operational Levels cannot perform offensive actions within the Hot Zone. Rescue or other aggressive actions are generally not appropriate for individuals trained at these levels. Failure to heed this limitation of action can easily lead to the death or serious injury of the responder. **Be part of the solution; don't become part of the problem!**

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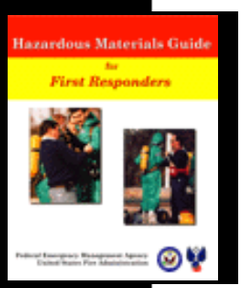

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Operational Level Response

Awareness Level Response

First Responders at the Awareness Level are expected to recognize the presence of hazardous materials, protect themselves appropriately, call for help, and secure the area.

Several clues can provide assistance in establishing the presence and identity of a hazardous material. Use your senses, but with caution. Many hazardous materials have odors or produce visible clouds. Even though the presence of some materials can be detected by smell at very low and even non-toxic levels, this is not a reliable indicator of potential toxicity. Other materials can be fatal without any detectable odor. If an odor is detectable, you may already be too close and need to retreat.

Another clue is the nature of the site of the incident. Anticipate the presence of certain kinds of materials in certain types of buildings. For example, a burning barn or hardware store is likely to contain pesticides and should be dealt with accordingly. Manufacturing facilities are likely to have a variety of solvents. Tank farms will probably contain petroleum products. Other types of structures may provide clues about the hazardous materials they might contain.

If containers are involved, the shape may provide a clue to the contents. Silhouettes of rail cars, tank trucks, and fixed site tanks used to carry or store materials are shown **here**. While not likely to identify the specific chemical name, the silhouette guide may identify the general type of material involved.

Markings on containers, buildings, or facilities may also provide material identification information. Under DOT regulations, some rail cars must be labeled with the name of the material they contain (see **Railroad Tank Car Marking System**). The NFPA 704 placard system (see **Table 1**) is widely used on container labels and fixed facilities. This system provides valuable information about the risks associated with the material(s) in the facility. Other marking systems exist which are similar to the NFPA 704 system. DOT placards on vehicles may provide an additional clue to the nature of the contents. These placards on vehicles may include or be found above an identification number. This number is the UN Number for the material contained in the vehicle and can be used to identify the material or class of material by using this book or the North American Emergency Response Guide. DOT symbols may also be used as labels on containers of material in commerce. All markings on vehicles, buildings, and rail cars should be observed from the greatest distance possible. First Responders should carry a pair of good binoculars.

First Responders may have access to papers describing the contents of shipments (shipping papers, bills of lading, etc.) and/or the hazards associated with these materials. At a fixed facility MSDS (Material Safety Data Sheets), which will identify the specific material(s) and associated hazards, should be available. Shipping papers, which identify the chemical or chemicals present, are usually located in the cabs of trucks, the first engine of freight trains, on the bridge of ships and in a marked tube-like container on the deck of a barge. Frequently during transportation accidents shipping papers are inaccessible and identifying the involved materials becomes part of the overall problem. Until the material is identified, it should be treated as if it were extremely hazardous.

Securing the area around a hazardous materials incident is a vitally important action of the First Responder. It may not be immediately apparent what area to secure, particularly if the hazardous substance and/or quantity are unknown. It is usually wise to secure a wide area, particularly if the material is known to be highly toxic. In general, keep ignition sources, such as sparks and flares, out of the secured area until you know that there is

no flammability or explosion risk.

For large releases of flammable, explosive or toxic gases, the First Responder must alert inhabitants of the surrounding area. This is particularly true for heavier-than-air gases or vapors, which will not disperse as they spread. Do not expose yourself to the material by entering areas downwind or below grade. Evacuation, with all of its difficulties, will be necessary for some materials and situations. For others, the best option is to shelter in place - that is, move people inside, close doors and windows, and shut down air intake distribution systems - until the gas or vapor has moved past or dispersed. Remember that wind directions may change during an incident, so the at-risk populations or areas need to be continually reevaluated with on-site wind direction information.

Remember that a dead or injured First Responder is of no help to anyone. Protect yourself! Do not enter the contaminated area. Do not attempt to rescue victims who have been contaminated with highly toxic or dangerous materials. Fire fighting gear is not chemical protective clothing. Many chemicals call for specialized personal protective clothing and expertise that is above the capability of Awareness or Operational level personnel.

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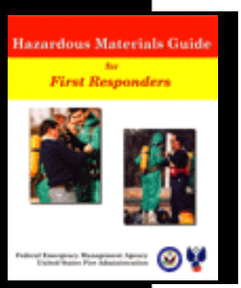

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Hazmat incidents occur under a wide variety of conditions. For some of these situations there are special considerations and concerns. Listed below are some of these considerations and concerns for Hazmat incidents involving highway transport, rail transport, marine transport, fixed facilities, pipelines, radioactive materials, cryogenic tanks, chemical and biological terrorism and illegal or clandestine drug laboratories.

Highway Transport: Accidents on highways involving trucks carrying hazardous materials are perhaps the most common cause of Hazmat incidents. Many of these incidents occur in heavily populated areas and may involve large quantities of hazardous materials. Shipping papers are kept in the truck cab, which may be inaccessible if there is a leak or fire. Shipping papers will include a contact telephone number for emergency information. DOT placards provide information on the nature of the cargo. Unfortunately, some trucks containing hazardous materials may not have placards, either in violation of DOT regulations or because the quantities of material being transported do not require a placard. Placards don't always tell the whole story. Trucks can carry dangerous amounts of hazardous materials and still be under the legal amount required to have a placard. Many UN Numbers, which may appear on or below the placard, represent a variety of compounds which may pose varying risks. If the shipper and truck numbers are know, CHEMTREC7 (1-800-424-9300) can often identify the cargo. Any truck or van should be assumed to contain hazardous materials. Until the cargo is identified all action should be undertaken from a safe distance. Tank trucks, in particular, often contain materials which may explode or BLEVE. If it is possible, cool tank trucks exposed to heat with water from an unattended monitor. This should only be considered if an adequate water supply is available and enough trained personnel are quickly on the scene.

Rail Transport: Hazmat incidents involving trains are often complicated by the large amounts and numbers of materials found on a single train. These materials may chemically interact if they come in contact with one another. This creates a major risk of personal injury or property damage, further compounding the problem. Train incidents also may occur in relatively remote areas, which may limit the availability of personnel, equipment, and water. Shipping papers on trains are found with the engineer in the first engine. Initial assessment should be done from a safe distance through binoculars without approaching a train. There may be sufficient information on the outside of the rail cars to identify the materials they contain. The **silhouette information** may also be helpful in identifying different types of cars and their possible cargoes. Many materials shipped by rail will BLEVE if their tanks are heated by fire. These tanks may travel several thousand feet. It is generally best to maintain a safe distance until trained personnel and equipment arrive. Remember, if there is a fire stay away from the sides of cars and the train because of the risk of a BLEVE.

Marine Transport: Shipboard incidents in which land based responders are involved usually occur in heavily populated port areas. The quantities of hazardous materials involved can be very large, creating huge potential risks to adjacent populations and property. Cargos may also contain multiple chemicals with the possibility of chemical reaction. Most ships and barges will not be labeled or placarded. Shipping papers or manifests for cargo are usually located with the first officer on the bridge of a ship. On a barge, shipping papers are in a tube-like container or mailbox on the deck. The Coast Guard Captain of the Port is responsible for dealing with releases and fires. Frequently land based responders are called upon to assist in the incident response. Land based responders in port areas need to be familiar with the various jurisdictions and issues relating to both shipboard fires and waterway pollution. All ships and most towboats have crews who are trained to deal with releases and fires.They also will have varying amounts of on-board fire fighting equipment. Towboats may not have adequate equipment to fight on-board fires. Barges do not have adequate equipment to fight on-board fires or control releases. Fire companies responding to marine incidents should be equipped with International Shore Connection fittings to permit the pumping of water from shore into the firefighting system on board ship.

Fixed Facilities: Fixed facilities include both open facilities such as bulk liquid terminals and open processing areas, and closed facilities such as manufacturing or processing

plants, laboratories, warehouses, and retail establishments. In general, the quantity of material in fixed facility incidents has the potential to be very large, particularly if there are large storage containers on site. There are also likely to be several hazardous materials at any given site. Identification of the materials at a site may be made from labeling, MSDS provided by facility personnel or from community inventories provided under SARA Title III. NFPA 704 placards may provide general information about the nature of the hazards in a particular facility or building (see **Table 1**). The NFPA 704 designations indicate the most severe risks associated with all of the materials in the building or facility. Be aware that buildings or containers may have inaccurate placards. Fixed facilities are often in industrial zones and may have other hazardous materials sites located in close proximity. There may also be many people working on or close to the site.

First Responder actions at a fixed facility Hazmat incident should be defensive in nature. After rapidly assessing the situation, notify the appropriate authorities and support services. Deny entry to the building or facility and consider evacuation. If a multi-story structure is involved and the released material is a gas that is heavier than air, it may not be desirable to evacuate the upper floors of the building. A decision can be made to shut down the heating, ventilating, and air conditioning (HVAC) system in a building if the risk of evacuating and dispersing a gaseous material appears greater than the explosion or flammability risk of leaving it contained in a portion of the building. Refer to this guide or other sources of information for aid in making that decision. If the HVAC is left on, it may also be possible to increase dispersion by leaving other building doors and windows open. For liquid releases from storage tanks it may be possible to prevent spread by diking or damming. This must be done well ahead of the liquid to prevent exposure of personnel and should only be attempted if it can be done safely.

If there is a fire, it may be preferable not to extinguish it until the nature of the material(s) is known and adequate resources are assembled. For some materials, allowing them to burn poses much less risk to the responder and surrounding areas than trying to extinguish them. It may be possible to protect surrounding structures or storage tanks by the use of a cooling fog stream, preferably from an unattended monitor. For some materials, fog streams can be used to suppress or disperse vapor releases. Information on all of these approaches will be found in the material specific sections of this book. Liquid chemical tanks exposed to flame impingement may explode or BLEVE, so maintain a safe distance if a fire is present. Many fixed facilities may have firefighting capabilities, including sprinkler systems and/or special suppressing or extinguishing agents. These may help to suppress fires. They may also suggest what firefighting agent is appropriate for the materials involved.

Pipelines: Pipelines carry many hazardous materials. If a pipeline breaks, very large quantities of materials can be released over a short period of time. Depending upon the material, this means that the cloud, fire, or release could be very large and will continue to grow until the flow stops. The key is to minimize the release by cutting off the flow at the pumping station or other shutoff. This will generally be done by pipeline personnel. Do not fight the fire or approach the scene until the flow has been stopped.

Radioactive Materials: There are many radioactive materials in commerce, usually in small quantities. Larger quantities may be encountered at fixed facilities. All containers, including packages, vehicles, and rail cars, containing radioactive material are required to carry a warning label or placard. Buildings or containers at fixed facilities containing radioactive material should also carry appropriate warning labels. If such a label is present at the scene of an accident, First Responders should generally back off until trained personnel and appropriate equipment are available to assess the situation.

There are several types of radiation hazards. Different radioactive materials produce different types of radioactivity. The most common radioactive materials in commerce produce alpha and beta particles. Other materials may produce x-rays, gamma rays or neutron particles. While all of these can potentially damage human tissue, alpha and beta particles do not penetrate the skin, so will not cause damage unless the actual material emitting these particles gets into the body by swallowing it, breathing it in, or getting it into an open wound. Avoiding physical contact with the material prevents these potential injuries. X-rays, gamma rays, and neutron particles do penetrate clothing and skin and can cause damage if the amount of radiation is sufficient. Exposure to these forms of radiation is only prevented by using a heavy metal shield. As with alpha and beta particle producers, contact with the material must be avoided. Injury caused by radiation may not develop for many days or even years after exposure.

Radioactivity is not destroyed by fire. In fact fire, explosion, and water dispersion as part of a fire may make a radioactive material incident worse by spreading radiation-emitting material over a large area. Remember if you see a radioactive warning label or placard: Back off until the experts arrive.

Cryogenic Gases: Cryogenic gases are gases shipped and stored refrigerated and

under pressure. **Tank shape** and a visible vapor cloud upon release should alert the First Responder to the presence of a cryogenic gas. When cooled to very low temperatures (less than -150° F) and/or placed under pressure, these gases become liquids that take up less space for storage and shipment. These gases, some of which are extremely flammable (hydrogen and LNG) or toxic (chlorine), pose a major risk to the first responder. All of these gases are released from storage vessels at temperatures so low that they will instantly freeze unprotected tissues like skin and eyes. The release of even small amounts of gas can produce large amounts of vapor. Leaking cryogenic containers should not be approached. Trained personnel and appropriate equipment are required to stop the leak. Materials on fire should be allowed to burn until the release can be stopped. It is important not to put water, fog, or foam on cryogenic tanks or pools of cryogenic liquids, whether or not they are burning. The water will act as a heater, increasing evaporation or burning. Water, foam, and fog cannot extinguish a cryogenic fire. The cold vapors rising from a pool of cryogenic liquid almost always hug the ground and drift downwind without rapid dispersion.

Chemical and Biological Terrorism: Chemicals have been used in organized warfare since World War I. While biological agents such as highly infectious and toxic bacteria ("germ agents"), have been researched as potential war agents since the 1930's, they have never been used on a large scale. In recent years, fears have mounted that both chemical and biological agents could be used in terrorist actions against either civilian or military targets. In fact, chemical agents have now been used in such a fashion.

For this reason it is important that first responders become familiar with possible chemical agents involved in these incidents and how to appropriately respond. While biological agents, like germ agents, could be used in terrorist attacks, they would most likely unfold as an outbreak of a disease. It is unlikely that first responders will find themselves involved in these kinds of incidents because identification and response would then be provided primarily by public health authorities. Nuclear terrorism is also a possibility, however, response to nuclear accidents or events is beyond the scope of this book and the scope of training of most First Responders.

While we tend to think of chemicals used in terrorist attacks as highly specialized substances designed for war, in fact, many common industrial chemicals have similar properties and toxic potential. Chlorine gas, for example, has been used as a war gas. Many experts in terrorism think it is more likely that terrorists would use these easily available chemicals instead of the more exotic agents designed for war. Terrorist incidents might well involve the sabotage of industrial complexes near densely populated areas. Therefore, the technical and response problems posed by such an incident would be almost identical to other scenarios discussed in this book. It is important to remember that if terrorism or sabotage is suspected by the first responder appropriate law enforcement personnel should be notified and, to the extent possible, attempts should be made not to disturb or destroy potential evidence. Concern for evidence should not, however, prevent the first responder from carrying out actions appropriate for the chemicals involved. It is also important to remember that terrorists may booby-trap a scene in order to hinder response and produce additional casualties. First responders must remain alert for such possibilities. Secondary explosives for instance can be set to be detonated by radio signals transmitted from approaching response vehicles.

Table 2 lists the kinds of chemical agents which have been used or proposed for use in terrorist attacks. The physical properties and symptoms they can produce in exposed individuals are also listed. Important information on all of these chemical agents can be found in this book, either in the Specific Materials Guides or in the Materials Summary Response Table. First responders should be familiar with the common physical symptoms caused by each kind of agent. These symptoms are likely to be the first clue that one of these agents is involved in an incident.

Illegal or Clandestine Drug Laboratories: Illegal or clandestine drug laboratories pose a new and often significant risk for first responders. Such operations may contain a wide variety of chemicals, particularly flammable solvents, which are used in the production of illegal drugs. Unlike most legitimate manufacturing facilities, it will usually be impossible to obtain a listing of the chemicals present. Most of the chemicals commonly used in these laboratories will be found in this book because they are also found in legitimate manufacturing facilities. Some of the drugs usually produced in these laboratories and some of the chemical intermediates with drug-like actions are not included in this book. There have been reports of serious injuries to first responders from exposure to these drugs and chemical intermediates. For this reason, if the presence of an illegal or clandestine drug laboratory is suspected, extreme caution should be exercised by the first responder and exposure to chemicals at the scene should be avoided. Law enforcement personnel should be notified about the laboratory and, to the extent possible, attempts should be made not to disturb or destroy potential evidence.

The chemical specific sections of this book are designed to remind the responder of many of the basics discussed above as well as provide information on what options need

to be considered for each specific chemical.

WHERE TO GET HELP

There are a number of sources of information available to the First Responder. Listed on the **Contacts Page** are several national sources with which the First Responder should be familiar. Local and state sources of information such as health departments, Hazmat teams, industrial aid groups, emergency service agencies, and others should also be considered as valuable resources.

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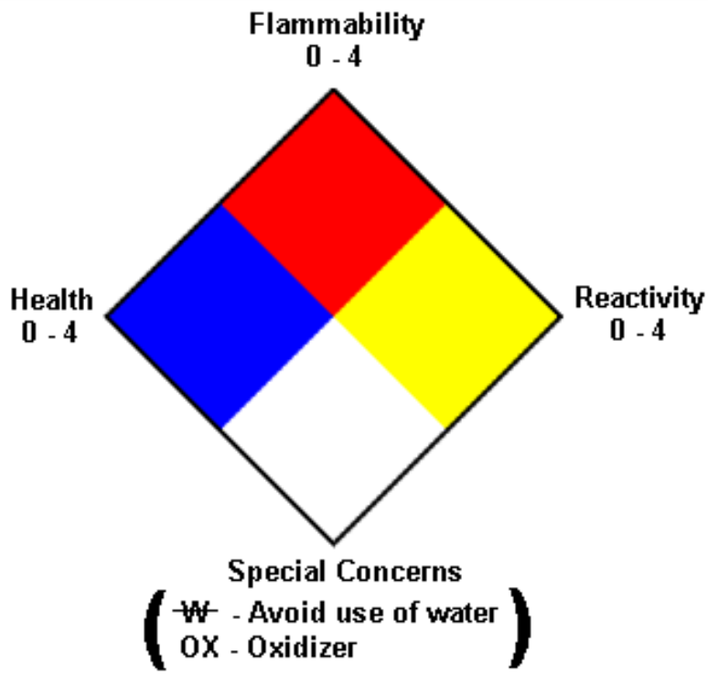
USFA Hazardous Materials Guide for First Responders Table 1 - National Fire Protection Association (NFPA) Fire Diamonds (NFPA No. 704-1991)					
Identification of Health Hazard Color Code: BLUE		**Identification of Flammability Color Code: RED**		**Identification of Reactivity Color Code: YELLOW**	
Type of Possible Injury		**Susceptibility of Materials to Burning**		**Susceptibility to Release of Energy**	
Signal		Signal		Signal	
4	Materials that on very short exposure could cause death or major residual injury.	4	Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or that are readily dispersed in air and that will burn readily.	4	Materials that in themselves are readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.
3	Materials that on short exposure could cause serious temporary or residual injury.	3	Liquids and solids that can be ignited under almost all ambient temperature conditions.	3	Materials that in themselves are capable of detonation or explosive decomposition but require a strong initiating source or which must be heated under confinement before initiation or which react explosively with water.
2	Materials that on intense or continued but not chronic exposure could cause temporary incapacitation or possible residual injury.	2	Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.	2	Materials that readily undergo violent chemical change at elevated temperatures and pressures or which react violently with water or which may form explosive mixtures with water.
1	Materials that on exposure would cause irritation but only minor residual injury.	1	Materials that must be preheated before ignition can occur.	1	Materials that in themselves are normally stable, but which become unstable at elevated temperatures and pressures.
0	Materials that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.	0	Materials that will not burn.	0	Materials that in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.



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USFA Hazardous Materials Guide for First Responders Table 2 - Chemicals Likely Involved in Terrorist Incidents				
Kind of Agent	**Example of War Agents**	**Example of Industrial Chemicals**	**Physical Properties of Chemicals**	**Early Symptoms of Exposure**
Nerve Agents	Sarin Soman Tabun V-Agents	Organophosphate insecticides	Vapors or liquids Odorless to fruity odor	Tearing eyes Sweating Very small pupils Breathing problems Muscle weakness Abdominal pain
Blister Agents	HT Lewisite Mustard Gas	Dimethyl sulfate	Oily liquid	Skin and eye burns Breathing problems
Blood Agents	Cyanogen chloride Hydrogen cyanide		Liquids under pressure	Headache Breathing problems Convulsions Sudden death
Choking Agents	Ammonia Chlorine Phosgene		Gases - may be stored as liquids under pressure Irritating odor	Cough Breathing problems
Irritating (Crowd Control) Agents	Mace Pepper Spray Tear Gas	Chloroacetophenone Chloropicrin	Dusts or liquids Irritating odor	Tearing eys Cough Breathing problems
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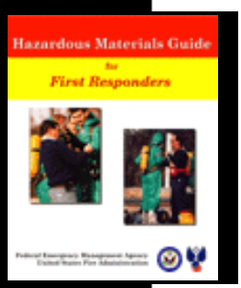

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Awareness Level Response

Operational Level Response

First Responders at the Operational Level, in addition to carrying out the actions of the Awareness Level Responder, may take defensive actions from a safe distance which will control the release and keep it from spreading. These actions are intended to protect nearby persons, property, and the environment from the effects of the release. Generally, First Responders at the Operational Level are not trained to enter the Hot zone and should not do so unless they have had specific training in dealing with the material and situation present.

In situations where there is only a release and no fire, Operational Level personnel should consider diking or diverting liquid runoff to prevent contamination of sewers or waterways. This must be done well ahead of the runoff to prevent personnel exposure and should only be attempted if it can be done safely. For release of gases it may be possible to suppress vapor clouds with fog lines or other agents using unattended monitors. For large releases, particularly of toxic gases, consider the evacuation or sheltering in place of populations downhill or downwind of the release. Remember that wind direction may shift during an incident and on-site wind direction monitoring is essential. You may be able to shut off a release from a safe distance. Do this only if the material is identified and the shutoff is outside the Hot zone.

If a fire is present in addition to a release, the incident is considerably more complicated. All of the tasks discussed previously must be considered and a decision must be made whether to fight the fire, and if so how. It is generally best to let a gas-fed fire burn unless you can stop the flow of gas by closing a valve at some distant point outside of the Hot Zone. Keep in mind that after you close a distant valve there will still be some gas in the line(s). Use fog lines to keep the area cooled and let the fire burn itself out. There may be an incident where it is necessary to extinguish a gas-fed fire in order to get to a valve to shut off the flow. Large amounts of fog may be used to cool down the area. Dry chemical or carbon dioxide extinguishers may be used to extinguish the fire. Extinguishing the fire without stopping the flow of gas is dangerous. The gas and air may form an explosive mixture. If the surrounding area is still hot it may provide an ignition source and cause an explosion. The explosion may cause more injuries and more property damage than the original fire.

If the products of combustion are less of a hazard than the leaking chemical, the best course of action may be to protect exposures and let the chemical burn itself out. The location of the incident will influence your decision. If you are in a rural area that is sparsely populated, the decision to let a fire burn will be much easier than if you are in the central business district of a major city. There may be pressure on the Incident Commander (IC) to extinguish the fire in order to minimize inconvenience to the local population. You must weigh all of your options and choose the course that presents the least risk to your personnel and the general public. The potential for harm is always more important than convenience. In some circumstances, if the identity of the material(s) is not known it may be better to let the material burn and concentrate on protecting life and surrounding property.

Foam can be very effective at vapor suppression and extinguishing many flammable liquids. Some materials, such as alcohols and amines, are water soluble and break down ordinary foam. You will see a listing "consider the application of alcohol based foam" for materials that are water soluble. Alcohol based foam is designed for these materials. If alcohol based foam is not available, regular foam may be helpful but may be required in higher application rates. Check your foam supplier and the container label for the uses and limitations of the foam you have. Keep in mind that 6% foam is 94% water. The use of foam on materials that are water reactive may not be desirable. The reaction may be

so great that it will outweigh the benefits of using foam. If you are going to attack a fire with foam BE SURE you have enough foam at the scene before you begin your attack. If you start without enough agent to finish the job, the fire will rekindle and destroy the foam blanket you have applied and you will lose any advantage you may have gained.

Carbon dioxide (CO2) and dry chemical are effective on many products. The limiting factor is the method of application. Generally, these agents come in handheld extinguishers requiring you to get within a few feet of the fire. With most hazardous materials, that is too close for personnel at the Operational Level. Handheld equipment is meant for first aid fire fighting and is designed for use on small fires. Some facilities have special extinguishers on wheels or vehicles containing dry chemical or CO2. Many large fire departments also have this equipment. If you have these kinds of resources you may be better able to fight larger fires. CO2 and Halon gases, are more effective at fighting fires in confined spaces - but they also present a significant asphyxiation risk to responders under these circumstances. Fires involving combustible metals usually require dry powder (not the same as dry chemical) extinguishers. If water is the correct agent to use, it is usually applied in the form of fog and applied in large volumes. Solid streams will cause powders and other materials to be spread about in an uncontrolled manner. Solid streams directed into burning liquids will splash the burning materials and may spread the fire. If you are operating at a fixed facilities, you should know in advance how much water you have available for fire fighting. At a transportation incident you may not have the volumes of water needed to safely attack a fire. "Back Off and Protect the Exposures" may be your best option. You don't attack a tank (military version) with a 22 caliber handgun. "If you don't have the water don't go to war."

Fog streams from unattended monitors or even large volume handlines that are tied off, can be effective in knocking down or suppressing vapors. Be aware that the mist that is falling back to the ground is now contaminated and must be managed. This may be done by diking or damming well ahead of the material runoff. Care must be taken to keep personnel out of danger from contamination or contact with the material. Pits may be dug to contain the runoff. With some chemicals, diluting the runoff water in the pit may reduce the hazard to a more manageable level.There may be times when it is desirable to knock down the vapors from a product that is water reactive. Under these circumstances, care must be taken to not let the water fall back onto the material. Set up your monitors well ahead of the material and be aware of changes in the wind direction or speed.

Many liquid containers, when heated, may explode or BLEVE. In a BLEVE large pieces of the tank may rocket great distances. The directions in which these pieces will travel is unpredictable and depends on the section of the tank that ruptures and on the tank supports. Tanks involved in a fire should be approached with great caution because of the risk of explosion or BLEVE.

Information about all of these concerns is provided in the material specific sections of this guide. The **First Responder Strategy Using the NFPA 704 Placard** can be used as a guide to fighting fires if only the NFPA 704 designations are known. Remember that this table only applies to materials designated with NFPA reactivity (yellow box) 0 or 1. For more reactive materials, maintain a purely defensive posture toward the fire.

Material Safety Data Sheets (MSDS), if they are available, are one of the best sources of information about materials. As part of your planning process get the MSDSs for major products in your jurisdiction. If you are dealing with a fixed facility, check with the Facility Emergency Coordinator (FEC). This person is required by SARA Title III to be the individual who has worked with the Local Emergency Planning Committee (LEPC) in the development of the community response plan as it relates to that facility. Make this person part of your Unified Command Staff. The FEC knows that facility and the materials involved better than you do. Listen to the advice you get, but keep in mind that the objectives of plant personnel may sometimes be different than yours. They may think first of the plant, while you must think first of the community. When there is a difference, you must make the decision keeping the good of the community in mind.

Some hard decisions are going to have to be made when it comes to rescuing victims in the Hot zone - decisions that in most cases can only be made by the IC at the time of the incident. The authors have attempted to offer some guidance, but the final decision will be yours. In the Awareness and Operational Level Training Response section of the chemical specific pages you may see the statement "Do not attempt rescue". This statement is used when the hazards to the would-be rescuer are so great that serious injury or death may result. Remember that under most conditions, if you are not trained at the Technician Level you cannot legally go into the Hot zone. In many cases normal fire fighting gear doesn't provide the protection you need to safely handle people in the area of contamination. In some situations it is possible that you might be able to rescue someone without putting yourself in danger. Danger is a relative term and the IC must determine the degree of danger present. In addition, the IC must then decide the level of danger that is acceptable for the rescue personnel. We do not trade rescue personnel for victims. Injury to emergency service personnel to effect a rescue is not acceptable in any community.

Next

Last Updated: November 9, 1998

USFA Hazardous Materials Guide for First Responders
First Responder Strategy Using the NFPA 704 Diamond

NFPA Reactivity Rating 0 - 1 (Rating 2 - 4 Defensive Only)

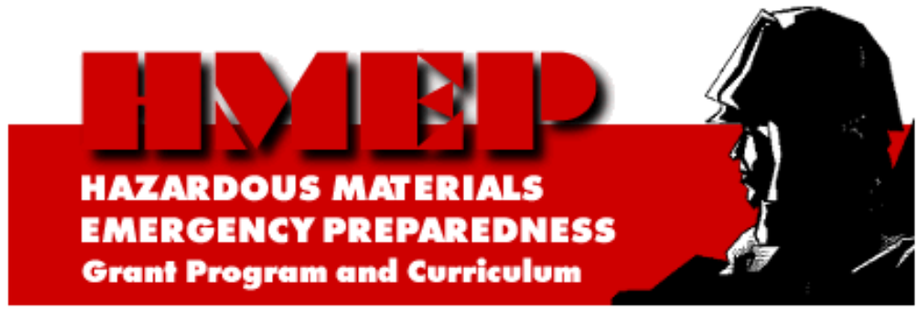
NFPA Health Rating					
4	Defensive operation only.	Defensive operation only.	Defensive operation only.	Defensive operation only.	Defensive operation only.
3	Defensive operation only when materials identified and deemed safe.	Defensive operation only when materials identified and deemed safe.	Defensive operation only when materials identified and deemed safe.	Defensive operation only when materials identified and deemed safe.	Defensive operation only when materials identified and deemed safe.
2	Attack from safe distance in full SCBA. Decontaminate personnel/equipment thoroughly when complete.	Attack from safe distance in full SCBA. Decontaminate personnel/equipment thoroughly when complete.	Attack from safe distance in full SCBA. Decontaminate personnel/equipment thoroughly when complete.	Attack from safe distance in full SCBA. Decontaminate personnel/equipment thoroughly when complete.	Attack from safe distance in full SCBA. Decontaminate personnel/equipment thoroughly when complete. Consider extra attack lines.
1	Attack with full protective clothing and SCBA. Decontaminate when finished.	Attack with full protective clothing and SCBA. Decontaminate when finished.	Attack with full protective clothing and SCBA. Decontaminate when finished.	Attack with full protective clothing and SCBA. Decontaminate when finished.	Attack with full protective clothing and SCBA. Decontaminate when finished. Consider extra attack lines.
0	Attack with full protective clothing and SCBA.	Attack with full protective clothing and SCBA.	Attack with full protective clothing and SCBA.	Attack with full protective clothing and SCBA.	Attack with full protective clothing and SCBA. Decontaminate when finished. Consider extra attack lines and master stream appliances.
	0	1	2	3	4

NFPA Flammability Rating

Last Updated: November 3, 1998

HMEP
- Background
- Calendar
- Federal Grant Programs
- Training Curriculum Guidelines
- Curriculum Working Reports
- Federal Contacts
- Grantee Contacts
- Hazmat Links

Hazmat Guide



HMEP Program Background

Program Calendar

Federal Grant Programs

Training Curriculum Guidelines

Curriculum Working Reports

Federal HMEP Contacts

Grantee Contacts

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Hazmat Guide

I. Overview of the HMEP Program

1. Overview

The Hazardous Materials Emergency Preparedness (HMEP) grant program is intended to provide financial and technical assistance as well as national direction and guidance to enhance State and local hazardous materials emergency planning and training. The Grant Program distributes fees collected from shippers and carriers of hazardous materials to emergency responders for haz mat training and to local emergency planning committees (LEPCs) for haz mat planning.

2. Background

The HMEP grant program evolved from a proposal developed by DOT, FEMA, EPA, DOL/OSHA, and DOE. It was presented to Congress during the legislative process to reauthorize the HMTA of 1974. Federal Hazardous Material law (FHML) creates an appropriate role for the Federal government to provide financial, technical assistance, national direction, and guidance to enhance State and local hazardous materials emergency planning and training.

The HMEP grant program is carefully crafted to build upon existing programs and relationships. It increases the emphasis on transportation in ongoing efforts. The HMEP grant program was designed to support the framework and working relationships established within the National Response System and the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 (Title III).

3. Planning Grants

FHML authorizes $5 million in annual planning grants to States, Territories and Native American tribes - with a 75% pass-through of funds to LEPCs.

These planning grants are to be used for: 1) developing, improving, and implementing emergency plans under Title III; 2) conducting commodity flow studies; and 3) determining the need for regional hazardous material response teams.

4. Training Grants

$7.8 million in annual training grants to States, Territories and Native American tribes - with 75% of the funding used to provide training to local responders, including volunteers.

Training grants are to be used for training public sector employees to respond safely and efficiently to accidents and incidents including those involving the transportation of hazardous materials.

5. Curriculum Guidelines Development

Using curriculum guidelines prepared by a national consensus process, States qualify courses they use for hazardous materials training.

The list of courses mandated by Congress consists of State qualified courses. In this way, a national list of courses will be generated in full partnership with the States.

Assistance is being given to States in using the qualification mechanism contained in the curriculum guidelines.

6. Accomplishments

Since the beginning of the program approximately $26 million has been awarded in HMEP grants

Over 454,000 responders and others have been trained in part thus far with HMEP grant funds.

Over 1,700 copies of the HMEP Curriculum guidelines have been distributed to grantees and local fire departments on a request basis (telephone (301) 447-1009 for a copy). The first public edition of the curriculum guidelines was distributed in March 1994. Grantees will use these guidelines to qualify courses for the list of courses mandated by Congress. Assistance is being provided to grantees in using the guidelines to qualify their courses. The first draft list of Grantee Assessed Hazardous Materials response Courses was published in April 1996.

A telephone survey indicates 3.2 million responders need training, much greater than earlier estimated.

43% of grantees are studying increases in response teams using HMEP funds.

II. HMEP Grant Procedures

(Published as: 49 CFR PART 110-Hazardous Materials Public Sector Training And Planning Grants, August 24, 1992)

Sec.

1. The authority citation for Part 110 is added to read as follows:
Authority: 49 App. U.S.C. 1815: 49 CFR Part 1.

- **110.1 Purpose.**
  This part sets forth procedures for reimbursable grants for public sector planning and training in support of the emergency planning and training efforts of States, Indian tribes, and local communities to deal with hazardous materials emergencies, particularly those involving transportation. These grants will enhance the implementation of tie Emergency Planning and Community Right-to-Know Act of 1988 (42 U.S.C. 11001).

- **110.5 Scope.**
  a. This part applies to States and Indian tribes and contains the program requirements for public sector training and planning grants to support hazardous materials emergency planning and training efforts.
  b. The requirements contained in 49 CFR part 18. "Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments", apply to grants issued under this Part.
  c. Copies of standard forms and 0MB circulars referenced in this part are available from the HMTUSA Grants Manager, Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street, SW., Washington DC. 20590-0001.

- **110.7 Control Number under the Paperwork Reduction Act.**
  The Office of Management and Budget control number assigned to collection of information in §§ 110.30, 110.70, 110.80, and 110.90 is 2137-0586.

- **110.10 Eligibility.**
  This Part applies to States and Indian tribes. States may apply for planning and training grants. Federally recognized Indian tribes may apply for training grants.

- **110.20 Definition.**
  Unless defined in this Part, all terms defined in Section 103 of the Hazardous Materials Transportation Act (HMTA) (49 App. U.S.C. 1802) are used in their statutory meaning and all terms defined in 49 CYR Part 18 and 0MB Circular A-102, with respect to administrative requirements for grants, are used as defined therein. Other terms used in this Part are defined as follows:
    - Allowable costs means those costs that are: eligible, reasonable, necessary, and allocable to the project permitted by the appropriate Federal cost principles, and approved in the grant.
    - Budget period means the period of time specified in the grant agreement during which the project manager may expend or obligate project funds.
    - Cost review means the review and evaluation of costs to determine reasonableness, allocability, and allowability.
    - Indian country means Indian country as defined in 18 U.S.C. 1151. That section defines Indian country as all land within the limits of any reservation under the jurisdiction of the U.S. Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation; all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a State; and all Indian allotments, the Indian tides to which have not been extinguished, including rights-of-way running through the same.
    - Indian tribe means a tribe "Federally-recognized" by the Secretary of the Interior under 25 CFR 272.2.
    - Local Emergency Planning Committee (LEPC) means a committee appointed by the State Emergency Response Commission under Section 301(c) of the Emergency Planning and Community Right-to-Know Act of 1985 (42 U.S.C. 11001(c)) that includes at a minimum, representatives from each of the following groups or organizations: elected State and local officials; law enforcement, firefighting, civil defense, first aid, health, local environmental, hospital, and transportation personnel; broadcast and print media; community groups; and owners and operators of facilities subject to the emergency planning requirements.
    - National curriculum means the curriculum required to be developed under Section 117A of HMTA and necessary to train public sector emergency response and preparedness teams, enabling them to comply with performance standards as stated in Section 117A(g)(4).
    - Political subdivision means a county, municipality, city, town, township, local public authority (including any public and Indian housing agency under the United States Housing Act of 1937 (42 U.S.C. 1401 et seq.), school district, special district, intrastate district, council of governments (whether or not incorporated as a nonprofit corporation under State law), any other regional or interstate government entity, or any agency or instrumentality of a local government.
    - Project means the activities and tasks identified in the grant agreement.
    - Project manager means the State or Indian tribal official designated in a grant as the recipient agency's principal program contact with the Federal Government.
    - Project officer means the Federal official designated in a grant as the program contact with the project manager. The project officer is responsible for monitoring the project.
    - Project period means the length of time specified in a grant for completion of all work associated with that project.
    - State Emergency Response Commission (SERC) means the State Emergency Response Commission appointed by the Governor of each State and Territory under the Emergency Planning and Community Right-to-Know Act of 1985.
    - Statement of Work means that portion of a grant that describes the purpose and scope of activities and tasks to be carried out as part of the proposed project.

- **110.30 Grant application.**
  General.
  An applicant for a planning or training grant shall use only the standard application forms approved by the Office of Management and Budget (OMB) (SF-424 and SF-424A) under the Paperwork Reduction Act of 1980 (44 U.S.C. 3502). Applicants are required to submit an original and two copies of the application package to: HMTUSA Grants Manager, Research and Special Programs Administration, U.S. Department of Transportation, 400 7th Street, SW., Washington, D.C. 20590-0001. Applications received on or before July 1st of each year will be considered in that cycle of the review and award process. An

initial round of the review and award process will consider applications received on or before November 15, 1992. Requests and continuation applications must include an original and two copies of the affected pages; previously submitted pages with information that is still current do not have to be resubmitted. The application must include the following:

1. Application for Federal Assistance for non-construction programs (SF-424) and Budget sheets (SF-424A). A single application maybe used for both planning and training if the budgets for each are entered separately on all budget sheets.
2. For States, a letter from the Governor designating the State agency that is authorized to apply for a grant and to provide the written certifications required to receive a grant.
3. For Indian tribes, a letter from the tribal government, governing body, or tribal council to the effect that the applicant is authorized to apply for a grant and to provide the written certifications required to receive a grant.
4. A written statement explaining whether the State or tribe assesses and collects fees on the transportation of hazardous materials and whether such assessments or fees are used solely to carry out purposes related to the transportation of hazardous materials.
5. A statement designating a project manager and providing the name, position, address and phone number of that individual who will be responsible for coordinating the funded activities with other agencies/organizations.
6. A project narrative statement of the goals and objectives of the proposed project, project design, and long range plans. The proposed grant project and budget periods may be one or more years.
7. A statement of work In support of the proposed project that describes and sets priorities for the activities and tasks to be conducted, the costs associated with each activity, the number and types of deliverables and products to be completed, and a schedule for implementation.
8. A description of the major items of costs needed to implement the statement of work and a copy of any cost or price analysis if conducted.
9. Drug-Free Workplace Certification. The applicant must certify as specified in appendix C of 49 CFR part 29 that it will comply with the Drug-Free Workplace Act of 1988 (Pub. L. 100-690, Title V, Subtitle D; 51 U.S.C. 701 et seq.).
10. Anti-Lobbying Certification. The applicant must certify as specified in appendix A of 49 CFR part 20 that no Federal funds will be expended to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress (section 319 of Pub. L. 101-121, 31 U.S.C. 1352).
11. Debarment and Suspension Certification. The applicant must certify as specified in subpart C of 49 CFR part 29 that it will not make an award or permit any award to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in Federal assistance programs.

Planning.

In addition to the requirements specified in paragraph (a) of this section, eligible State applicants must include the following in their application package:

1. A written certification that the State is complying with sections 301 and 303 of the Emergency Planning and Community Right-to-Know Act of 1986, including a brief explanation of how compliance has been achieved.
2. A written statement specifying the aggregate expenditure of funds of the State, exclusive of Federal funds, for each of its last two fiscal years for developing, improving, and implementing emergency plans under the Emergency Fi(inning and Community Right-to-Know Act of 1986, including an explanation specifying the sources of these funds. A written certification that the State's aggregate expenditures, as defined by the State, of funds for this purpose, exclusive of Federal funds, will not fall below the average level of its expenditures for its last two fiscal years. The applicant may not claim any of these expenditures for cost-sharing.
3. A written statement agreeing to make at least 75 percent of the Federal funds awarded available to LEPCs and an explanation of how the applicant intends to make such funds available to them for developing, improving, or implementing emergency plans.
4. Designation of a project manager to serve as contact for coordinating planning funds under this program.
5. A project narrative statement of the goals and objectives of each proposed project, including the following:
    - A background statement describing the applicant's long-term goals and objectives with respect to:
        - The current abilities and authorities of the applicant's program for preparedness planning;
        - The need to sustain or increase program capability;
        - Current degree of participation in or intention to assess

the need for a regional hazardous materials emergency response team; and
- The impact that the grant will have on the program.

- A discussion of whether the applicant's program currently knows, or intends to assess, transportation flow patterns of hazardous materials within the State and between that State and another State.
- A schedule for implementing the proposed grant activities.
- A statement describing the ways in which planning will be monitored by the project manager.
- A statement indicating that all members of the State Emergency Response Commission were provided the opportunity to review the grant application.

Training.

In addition to the requirements specified in paragraph (a) of this section, eligible State and Indian Tribe applicants must include the following in their application package:

1. For a State applicant, a written certification explaining how the State is complying with sections 301 and 303 of the Emergency Planning and Community Right-to-Know Act.
2. A written statement specifying the aggregate expenditure of funds of the State or Indian tribe, exclusive of Federal funds, for each of its last two fiscal years for training public sector employees to respond to accidents and incidents involving hazardous materials, including an explanation specifying the sources of these funds. A written certification that the applicant's aggregate expenditure, as defined by the State or tribe, of funds for this purpose, exclusive of Federal funds, will not fall below the average level of its expenditures for its last two fiscal years. The applicant may not claim any of these expenditures for cost-sharing purposes.
3. For a State applicant, a written statement agreeing to make at least 75 percent of the Federal funds awarded available for the purpose of training public sector employees employed or used by political subdivisions. A State applicant may elect to pass all or some portion of the grant on to political subdivisions for this purpose. The applicant must include a specific explanation of how it intends to meet this requirement.
4. Designation of a primary point of contact for coordinating training funded under this program. Identification of a single repository for copies of course materials delivered under the grant as specified in § 110.90 of this part.
5. A project narrative statement of the long-range goals and objectives of each proposed project, including the following:
    - A background statement describing:
        - The current hazardous materials training program(s):
        - Training audience, including numbers and levels of training and accreditation program for each level or criterion required to advance to the next level;
        - Estimated total number of persons to be trained under the proposed project;
        - The ways in which training grants will support the integrated delivery of training to meet the needs of individualized geographic and resource needs and time considerations of local responders. When appropriate, a statement describing how the proposed project will accommodate the different training needs for rural versus urban environments; and
        - The impact that the grant and the National Curriculum will have on the program.
    - A statement describing how the National Curriculum will be used or modified to train public sector employees at the local level to respond to accidents and incidents Involving hazardous materials.
    - A statement describing the ways in which effectiveness of training will be monitored by the project manager, including, but not limited to, examinations, critiques, and instructor evaluations.
    - A schedule for implementing the proposed training grant activities.
    - A statement indicating that all members of the State or Tribal Emergency Response Commission were provided the opportunity to review the grant application.

- **110.40 Activities eligible for funding.**

  Planning.

  Eligible State applicants may receive funding for the following activities:

  1. Development, improvement, and implementation of emergency plans required under the Emergency Planning and Community Right-To-Know

Act of 1985, as well as exercises which test the emergency plan. Enhancement of emergency plans to include hazard analysis as well as response procedures for emergencies involving transportation of hazardous materials, including radioactive materials.

2. An assessment to determine flow patterns of hazardous materials within a State, between a State and another State or Indian country, and development and maintenance of a system to keep such information current.
3. An assessment of the need for regional hazardous materials emergency response teams.
4. An assessment of local response capabilities.
5. Conduct of emergency response drills and exercises associated with emergency preparedness plans.
6. Provision of technical staff to support the planning effort.
7. Additional activities the Associate Administrator for Hazardous Materials Safety deems appropriate to implement the scope of work for the proposed project plan and approved in the grant.

Training.

Eligible State and Indian tribe applicants may receive funding for the following activities:

1. An assessment to determine the number of public sector employees employed or used by a political subdivision who need the proposed training and to select courses consistent with the National Curriculum.
2. Delivery of comprehensive preparedness and response training to public sector employees. Design and delivery of preparedness and response training to meet specialized needs. Financial assistance for trainees and for the trainers, If appropriate, such as tuition, travel expenses to and from a training facility, and room and board while at the training facility.
3. Emergency response drills and exercises associated with training, a course of study, and tests and evaluation of emergency preparedness plans.
4. Expenses associated with training by a person (including a department, agency, or instrumentality of a State or political subdivision thereof or an Indian tribe) and activities necessary to monitor such training including, but not limited to examinations, critiques and Instructor evaluations.
5. Provision of staff to manage the training effort designed to result in increased benefits, proficiency, and rapid deployment of local and regional responders.
6. Additional activities the Associate Administrator for Hazardous Materials Safety deems appropriate to implement the scope of work for the proposed project and approved in the grant.

- **110.80 Disbursement of Federal funds.**
  a. Preaward expenditures may not be reimbursed.
  b. Reimbursement may not be made for a project plan unless approved in the grant award.
  c. If a recipient agency seeks additional funds, the amendment request will be evaluated on the basis of needs, performance and availability of funds. An existing grant is not a commitment of future Federal funding.

- **110.60 Cost sharing for planning and training.**

  The recipient agency must provide 20 percent of the direct and indirect costs of all activities covered under the grant award program with non-Federal funds. Recipients may either use cash (hard-match) in-kind (soft-match) contributions, or a combination of in-kind plus hard match to meet this requirement. In-kind (soft-match) contributions are in addition to the maintenance of effort required of recipients of grant awards. The types of contributions allowed are as follows:

  1. Any funds from a State, local, or other non-Federal source used for an eligible activity as defined in § 110.40 in this part.
  2. The dollar equivalent value of an eligible activity as defined in § 110.40 of this part provided by a State, local, or other non-Federal source.
  3. The value of participants' salary while attending a planning or training activity contained in the approved grant application provided by a State, local, or other non-Federal source.
  4. Additional types of in-kind contributions the Associate Administrator for Hazardous Materials Safety deems appropriate.

  Funds used for matching purposes under any other Federal grant or cooperative agreement may not be used for matching purposes. The funds expended by a recipient agency to qualify for the grant may not be used for cost-sharing purposes.

  Acceptable contributions for matching and cost sharing purposes must conform to 49 CFR Part 18.

- **110.70 Financial administration.**

  A State must expend and account for grant funds in accordance with State laws and procedures for expending and accounting for its own funds. Fiscal control

and accounting procedures of the State, as well as its subgrantees and cost-type contractors, must be sufficient to:

1. Permit the preparation of reports required by 49 CFR Part 18 and this Part, including the tracing of funds provided for planning to a level of expenditure adequate to establish that at least 75 percent of the funds provided were made available to LEPCs for developing, improving, and implementing emergency plans; and the tracing of funds provided for training to a level of expenditure adequate to establish that at least 75 percent of the funds provided were made available for the purposes of training public sector employees employed or used by political subdivisions.
2. Permit the tracing of funds to a level of expenditure adequate to establish that such funds have not been used in violation of the restrictions and prohibitions of applicable statutes.

The financial management systems of Indian tribes and any subgrantees must meet the standards of 49 CFR 18.20, including the ability to trace funds provided for training to a level of expenditure adequate to establish that at least 75 percent of the funds provided were made available for the purposes of training public sector employees employed or used by political sub divisions.
Advances shall be made to States and Indian tribes consistent with 49 CFR part 18 and 31 CFR part 205. The Associate Administrator for Hazardous Materials Safety shall base these advances on demonstrated need, which will be determined on a case-by-case basis, considering such factors as State/ Tribal budget constraints and reductions in amounts budgeted for hazardous materials activities. To obtain an advance, a State or Indian tribe must comply with the following requirements:

1. A letter from the Governor or Tribal leader or their designee is required specifying the extenuating circumstances requiring the funding advance for the grant;
2. The maximum advance request may not be more than $25,000 for each State or Indian tribe;
3. Recipients of advance funding must obligate those funds within 3-months of receipt;
4. Advances including interest will be deducted from the initial reimbursement to the State or Indian tribe: and
5. The State or Indian tribe will have its allocation of current grant funds reduced and will not be permitted to apply for future grant funds until the advance is covered by a request for reimbursement. For example, if $25.000 is advanced for personnel costs, this advance would be deducted from the initial reimbursement in the year the advance was made.

To be allowable, costs must be eligible, reasonable, necessary, and allocable to the approved project in accordance with OMB Circular A-87 and included in the grant award. Costs incurred prior to the award of any grant are not allowable. Recipient agencies are responsible for obtaining audits in accordance with the Single Audit Act of 1984 (31 U.S.C. 7501), 49 CFR part 90, and OMB Circular A-128. Audits shall be made by an independent auditor in accordance with generally accepted government auditing standards covering financial and compliance audits. The Associate Administrator for Hazardous Materials Safety may audit a recipient agency at any time.

- **110.80 Procurement.**
  Project managers shall use procurement procedures and practices which reflect applicable State laws and regulations and Federal requirements as specified in 49 CFR 18.36.

- **110.90 Grant monitoring, reports, and records retention.**
  Grant monitoring. Project managers are responsible for managing the day-to-day operations of grant, subgrant and contract-supported activities. Project managers must monitor performance of supported activities to assure compliance with applicable Federal requirements and achievement of performance goals. Monitoring must cover each program, function, activity, or task covered by the grant. Monitoring and reporting requirements for planning and training are contained in this Part; general grant reporting requirements are specified in 49 CFR 18.40.
  Reports.
  1. The project manager shall submit a performance report at the completion of an activity for which reimbursement is being requested or with a request to amend the grant. The final performance report is due 90 days after the expiration or termination of the grant.
  2. Project managers shall submit an original and two copies of all performance reports. Performance reports for planning and training must include comparison of actual accomplishments to the stated goals and objectives established for the performance period, and the reasons for not achieving those goals and objectives, if applicable.
  3. Project managers shall report developments or events that occur

between the required performance reporting dates which have significant impact upon the planning and training activity such as:
    - Problems, delays, or adverse conditions which will impair the ability to meet the objective of the grant; and
    - Favorable developments which enable meeting time schedules and objectives sooner or at less cost than anticipated or producing more beneficial results than originally planned.
4. Financial reporting, except as provided in § 110.70 and 49 CFR 18.41, shall be supplied quarterly using Standard Form 270, Request for Advance or Reimbursement, to report the status of funds. The project manager shall report separately on planning and training.

Records retention. In accordance with 49 CFR 18.42, all financial and programmatic records, supporting documents, statistical records, training materials, and other documents generated under a grant shall he maintained by the project manager for three years from the date the project manager submits the final financial status report (SF 269) or Request for Advance or Reimbursement (SF 270). The project manager shall designate a repository and single-point of contact for planning and for training or both, for these purposes. If any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the 3-year period, the records must be retained until completion of the action and resolution of all Issues which arise from it, or until the end of the regular 3-year period, whichever is later.

- **110.100 Enforcement.**
  If a recipient agency fails to comply with any term of an award (whether stated in a Federal statute or regulation, an assurance, a State plan or application, a notice of award, or elsewhere) a noncompliance action may be taken as specified in 40 CFR 18.43. The recipient agency may appeal any such actions as specified in 49 CFR part 18. Costs incurred by the recipient agency during a suspension or after termination of an award are not allowable unless the Associate Administrator for Hazardous Materials Safety authorizes it in writing. Grant awards may be terminated in whole or in part with the consent of the recipient at any agreed upon effective date, or by the recipient upon written notification.

- **110.110 After-grant requirements.**
  The Associate Administrator for Hazardous Materials Safety will close out die award upon determination that all applicable administrative actions and all required work of the grant are complete in accordance with Subpart D of 49 CFR part 18. The project manager must submit all financial, performance, and other reports required as a condition of the grant, within 90 days after the expiration or termination of the grant. This time frame may be extended by the Associate Administrator for Hazardous Materials Safety for cause.

- **110.120 Deviation from this part.**
  Recipient agencies may request a deviation from the non-statutory provisions of this part. The Associate Administrator for Hazardous Materials Safety will respond to such requests in writing. If appropriate, the decision will be included in the grant agreement. Request for deviations from Part 110 must be submitted to: HMTUSA Grants Manager, Research and Special Programs Administration, U.S. Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590-0001.

- **110.130 Disputes.**
  Disputes should be resolved at the lowest level possible, beginning with the project manager and the project officer. If an agreement cannot be reached, the Administrator, RSPA, will serve as the dispute resolution official, whose decision will be final.

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May 18-19, 1999: National Hazardous Materials Emergency Preparedness (HMEP) Coordinated Grant Program Assistance Workshop, Phoenix, AZ

May 20-21, 1999: National Association of SARA Title III Program Officials (NASTTPO) Conference, Phoenix, AZ

May 24-28, 1999: Environmental Protection Agency (EPA)- CAMEO Conference

Last Updated: July 31, 1998

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Federal Hazardous Materials Planning and Training Grants to States

From NRT Fact Sheet, March 1997

BACKGROUND

The NRT created the Ad Hoc Committee on Federal Hazmat Grant Coordination to identify the key problems in the current grant funding process to states for hazardous materials emergency planning and training. Grant recipients made several suggestions for simplifying the process, one of which involved creating a fact sheet on the various grants available to States. This fact sheet is intended to provide an overview of the types of grants available to States; contact names for more in-depth information are provided.

FEMA'S HAZARDOUS MATERIALS GRANTS

Program Intent - FEMA provides three types of hazardous materials grants to states each with its own intent: Emergency Planning and Community Right-to-Know Act (EPCRA) funds are made available to State, local and tribal governments for hazardous materials training; EMA funds are made available to State and local governments to encourage the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations; CERCLA grants are made available to States through FEMA to facilitate State participation in the National Response System.

Present Focus - SARA grant programs include training provided by State fire academies to technician-level hazardous materials responders. EMA grants typically fund multi jurisdiction exercises and planning activities. Uses of the CERCLA funds include travel for participation in Regional Response Team meetings and participation in large scale exercises.

Eligibility - SARA funds are available to State and Tribal governments and U.S. territories. SLA funds are accepted from States, the District of Columbia, and territories and positions of the United States. CERCLA grants are available to States.

Applications Process - States or eligible governments should contact their FEMA regional office for further assistance.

Matching funds requirements - None.

Agency Contacts For the EPCRA program:

Philip McDonald
Emergency Management Institute
16825 South Seaton Avenue
Emmitsburg, Maryland 21727
(301) 447-1142

For SLA Programs the headquarters contact is:

C. Dwight Poe
Preparedness and Guidance Branch
Training and Exercise Directorate
Federal Emergency Management Agency
Washington, D.C. 20472
(202) 646-3492

For the CERCLA grants, the Agency contact is:

Ms. Juanita Harris
Preparedness, Training and Exercise Directorate
Federal Emergency Management Agency
Washington, D.C. 20472
(202) 646-3158

DOT'S HAZARDOUS MATERIALS EMERGENCY PREPAREDNESS GRANTS

Program Intent - The Hazardous Materials Emergency Preparedness (HMEP) grant program is intended to provide financial and technical assistance as well as national direction and guidance to enhance State and local hazardous materials emergency planning and training. It was crafted upon existing programs and relationships and increases emphasis on transportation. The HMEP grant program was designed to support the framework and working relationships established with the National Response System and EPCRA.

Present Focus -The HMEP grant program's present focus is on providing hazardous materials planning and training assistance to emergency responders and local emergency planning committees.

Eligibility - The HMEP grants are made to grantees designated by the governor of each State. Grants are made to Native Americans on a competitive basis.

Application process - Applications for State and Native American HMEP grants are due on July 1 of each year. Target amounts for State grants are provided to grantees at a workshop held in April each year. Applicants for Native American grants also receive applications at this workshop. Grants are made by September 30 of each year.

Matching funds requirements - HMEP grants require a 20% soft match.

Agency contacts - Applications for State and Native American HMEP grants should be sent to:

Charles G. Rogoff
HMEP Grants Manager, USDOT
400 7th Street S.W.
Washington D.C. 20590
(202) 366-0001.

EPA'S TECHNICAL ASSISTANCE GRANTS

Program Intent - The purpose of the Chemical Emergency Preparedness and Prevention (CEPP) Technical Assistance Grants (TAG) Program is to help States and Tribes develop chemical accident prevention programs as well as to integrate their chemical accident prevention activities with related activities under EPCRA, pollution prevention, and other environmental and safety programs. Where possible, these grants should also address priority risk as well as environmental equity.

Present Focus - This year's primary focus is the development of State, Tribal, or local accident release prevention program. The second area of focus in 1997 is the development of local structures and activities related to chemical accident prevention, community emergency preparedness, and risk communication.

Eligibility - Tribes, States, the District of Columbia, and all U.S. territories and possessions are eligible. Awards will be made to State Emergency Response Commissions or to another State agency with a co-signature by the SERC Chair.

Application process -Applicants must complete the "Application for Federal Assistance" and other forms included in the application package. In addition, applicants must submit a description of the proposed project, including the following: clear Statement of project purpose; current CAA 112(r) and EPCRA activities; schedule of key project tasks; listing of key project personnel and qualifications; budget proposal describing the proposed use of funds and matching contributions for all budget categories; and special attention to the selection criteria. Selection criteria include potential benefit, technical soundness, and priority need.

States should work with the EPA CEPP Regional contact as they develop a grant proposal. Regional CEPP offices will evaluate each application and EPA Headquarters

will review each Regional evaluation and each application. Awards should be made by early October 1997.

Matching funds requirements - States match 25% of the total project cost.

Agency contacts - The TAG contact is Bill Finan Chemical Emergency Preparedness and Prevention Office (202) 260-0030

Last Updated: April 2, 1997

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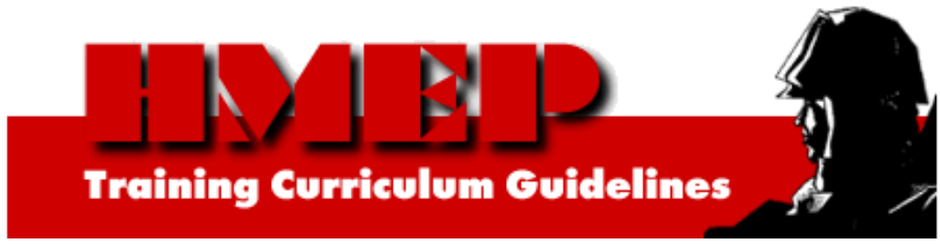

Introduction

Introduction, as .pdf file

Response Training Guidelines

Planning Training Guidelines

Training Program Management

Credits

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1999 Hazardous Materials Curriculum Report

- Hazardous Materials Curriculum Workplan 5/99: 37 KByte Word Document
- 1999 Hazardous Materials Issues and Challenges : 58 KByte Word Document
- Proposals for 2000 Guidelines for Public Sector Hazardous Materials Training 5/99 : 30 KByte Word Document

Hazardous Materials Training

- Status of New EMI Planning Curriculum 5/99: 119 KByte Word Document
- Status of Hazardous Materials Prevention Training Guidelines 5/99: 28 KByte Word Document
- Status of 1999 Catalog of Assessed Hazardous Materials Response Courses 5/99: 23 KByte Word Document
- Grantee Input Forms for Curriculum Workplan 5/99: 27 KByte Word Document
- Hazardous Materials Curriculum Author Team Contacts 5/99: 35 KByte Word Document

Draft Haz Mat Prevention Guidelines

- Prevention Training Issues: 62.3 KByte PDF Document
- Prevention Awareness: 33.1 KByte PDF Document
- Prevention Policy Development: 32.9 KByte PDF Document
- Transportation/Facility Prevention Program Management: 65.3 KByte PDF Document
- Community Prevention Program Management: 43.0 KByte PDF Document
- Prevention in Operations: 32.5 KByte PDF Document
- Design and Plans Review: 33.4 KByte PDF Document
- Inspection and Enforcement: 32.5 KByte PDF Document

- Appendix A: Prevention Authorities: 41.3 KByte PDF Document
- Appendix B: Training Mandates: 31.5 KByte PDF Document
- Appendix C: Federal Programs: 60.6 KByte PDF Document
- Appendix D: OSHA 1910.119: 73.3 KByte PDF Document

- Future Issues Report 10/97 : 49 KByte Word Document
- HMEP Prevention Curriculum Guidelines Focus Group Meeting - 2/97
- Prevention Curriculum Report - 1/97
- Indianapolis HMEP Workshop Report - 12/96
- Planning Curriculum Workplan - 12/96
- Response Training Committee Reports - 12/96
- Prevention Curriculum Workplan -12/96

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CFR

1995,1996 and 1997 Federal Register
http://www.access.gpo.gov/su_docs/aces/aces140.html

Code of Federal Regulations - Retrieve
http://www.access.gpo.gov/nara/cfr/cfr-retrieve.html

Code of Federal Regulations (searchable)
http://law.house.gov/cfr.htm

NationalArchives and Records Administration
http://www.access.gpo.gov/nara/index.html

Orders,Regulations, Policies, and Legislation
http://www.dot.gov/general/orders.html

The Code of Federal Regulations
http://www.access.gpo.gov/nara/cfr/cfr-table-search.html#Title1

U.S.House of Representatives - Internet Law Library - Code of Federal Regulations:
http://law.house.gov/4.htm

Coast Guard

United States Coast Guard Home Page
http://www.dot.gov/dotinfo/uscg/welcome.html

US Coast Guard
http://www.dot.gov/

EPA

Regulations
http://www.epa.gov/swercepp/

Rules and Regulations
http://www.epa.gov/epahome/rules.html

US Environmental Protection Agency
http://www.epa.gov/

FEMA

Federal Emergency Management Agency
http://www.fema.gov/

Federal Emergency Management Agency - Reference Library
http://www.fema.gov/library/

The Federal Response Plan
http://www.fema.gov/fema/fed1.html

Haz Mat, Industry Resources

Additional Internet Resources on Hazards and Disasters
http://www.colorado.edu/hazards

Chlorine Chemistry Council
http://c3.org/

NH3 World Report
http://www.nh3.com

Water-Wastewater Web
http://www.w-ww.com/

Haz Mat/Health, Govt. Resources

ATSDR- ATSDR's Home Page
http://www.atsdr.cdc.gov

Chemical Science and Technology Laboratory
http://www.cstl.nist.gov/

Environmental Organization WebDirectory
http://www.webdirectory.com/Government/US_Agencies/

National Association of SARA Title III Program Officials (NASTTPO)
http://www.geocities.com/CapitolHill/6286

State of Michigan - Hazardous Materials Training Center

Government:US Agencies

Research and Special Programs Administration
http://www.rspa.dot.gov

Useful Internet Sites
http://www.usfa.fema.gov/

Library of Congress

Library of Congress World Wide Web (LC Web) Home Page
http://www.loc.gov/

Library of Congress WWW/Z39.50 Gateway
http://www.loc.gov/z3950/

MSDS's

Chemical Abstracts Service (CAS)
http://info.cas.org/welcome.html

F&M Material Safety - MSDS Resources
http://www.fandm.edu/Departments/MaterialSafety/MSDSs.html

Index of /MSDS
http://physchem.ox.ac.uk/MSDS/

NFPA

NFPA Chemical Hazard Labels

http://www.orcbs.msu.edu/chemical/nfpa/nfpa.html

NIEHS

Environmental Health Clearinghouse Home Page
http://infoventures.com/e-hlth/

National Institute of Environmental Health Sciences
http://www.niehs.nih.gov/

NIOSH-CDC

CDC Prevention Guidelines
http://aepo-xdv-www.epo.cdc.gov/wonder/prevguid/prevguid.htm

NIOSH Home Page
http://www.cdc.gov/niosh/homepage.html

NRT

Home Page of the U.S. Environmental Protection Agency: National Response Team;
http://www.nrt.org/index.html

NRT Home Page: Missing Pages
http://www.nrt.org/disclaim.htm

The National Response Team's Integrated Contingency Plan Guidance
http://www.nrt.org/one-plan.htm

OES

Emergency Management, Marion County Oregon
http://www.open.org/memanage/

Maine Emergency Management Agency
http://www.state.me.us/mema/memahome.htm

OES Home Page
http://www.oes.ca.gov

OSHA

OSHA Regulations (Standards - 29 CFR) Table of Contents
http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc.html

Table of Contents by Directive Number
http://www.osha-slc.gov/OshDoc/Directive_toc/Directive_toc_by_drn.html

Table of Contents for CPL - Compliance
http://www.osha-slc.gov/OshDoc/Directive_toc/toc_for_CPL.html

The USDOL OSHA Home Page
http://www.osha.gov/

U.S. Department of Labor
http://www.dol.gov/

U.S.DOL - Regulatory and Statutory Information
http://www.dol.gov/dol/public/regs/main.htm

Research

Argus/University of Michigan Clearinghouse

http://www.clearinghouse.net

Environmental Organization WebDirectory - Science:Geology
http://www.webdirectory.com/Science/Geology/

NCSA Mosaic Demo Document
http://www.ncsa.uiuc.edu/demoweb/demo.html

NCSA Mosaic Home Page
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The World-Wide Web Virtual Library: Chemistry
http://www.chem.ucla.edu/chempointers.html

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UCSTRI-- Cover Page
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Welcome to Britannica Online
http://www.eb.com/

Welcome to the Electric Library
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US House of Reps

U.S.House of Representatives - Internet Law Library - U.S. Code (searchable)
http://uscode.house.gov/usc.htm

Last Updated: May 24, 2000

Hazardous Materials

Prevention Training Guidelines

Prevention Training Issues

General Training Issues

INTRODUCTION

Since most hazardous materials accidents are caused by human activities, communitites and emploers can influence the probability of incidents and the magnitude of their effects by emphasizing **prevention** in hazardous materials emergency management. As defined here, prevention is a "*proactive attitude, effort, and process for eliminating or reducing the effects of hazardous materials events in advance of occurrence."* In other words, prevention focuses on helping communities and citizens avoid becoming disaster victims in the first place, and reducing the impact of incidents when they occur.

Hazardous materials prevention includes efforts to eliminate or reduce risk due to either accidental releases of hazardous materials or exposure to toxic substances. Basic prevention strategies can be broadly summarized as follows:

- Improve methods and procedures for storing, transporting, handling, and processing hazardous materials.
- Promote compliance with safety codes, regulations, and statutes.
- Develop and enforce land use plans that regulate the location of sites with hazardous chemicals.
- Increase public and community awareness and support for prevention.

Well-designed prevention programs have been shown to reduce loss of life, property, and environmental damage from disasters. The Occupational Safety and Health Administration (OSHA) concludes that "a strong correlation (exists) between the application of sound management practices in the operation of safety and health programs and a low incidence of occupational injuries and illnesses. Where effective safety and health management is practiced, injury and illness rates are significantly less than rates at comparable worksites where safety and health management is weak or non-existent" (*Safety and Health Program Management Guidelines; Issuance of Voluntary Guidelines*).

As noted by the Federal Emergency Management Agency (FEMA), "experience has shown again and again that lives can be saved, damage to property can be reduced significantly, and economic recovery can be accelerated by consistently building safer and stronger buildings, strengthening existing infrastructures, enforcing building codes, and making the proper preparations BEFORE a disaster occurs. More important, mitigation investments by...businesses and citizens...will enhance and strengthen the economic structure, stability, and future of (the) community regardless of when a disaster may strike" (*Project Impact Guidebook)*.

In recent years, both government and industry have made significant strides in hazardous materials prevention. However, more must be done to encourage a change from the traditional focus on disaster preparedness and response to a new emphasis on accident prevention. This shift in perspective by business leaders and emergency management professionals will require adjustments in corporate and community attitudes about prevention, improvements in safety management methods and technologies, better access to information and research, and a strengthened cooperation between government agencies and hazardous materials end users.

One of the most effective ways of promoting this transition is through prevention training and education programs. Training helps employees understand the nature and causes of potential safety problems, apply safe work practices and procedures, and participate in the design of effective prevention programs. For this reason, federal and state agencies have consistently identified training as a critical component in all prevention activities.

This document identifies training requirements for public and private sector personnel who have a role in hazardous materials prevention. The information is organized into three sections:

- A narrative overview describing the nature of hazardous materials prevention, related programs, and training activities.
- A description of prevention training audience categories and training requirements presented in the form of detailed instructional objectives.
- Appendices that summarize prevention laws, regulations, programs, and other information helpful to training managers.

HAZARDOUS MATERIALS PREVENTION

The Philosophy of Prevention

Hazardous materials prevention is based on the concept that the majority of accidents don't just happen—they are caused. While the use of chemicals may involve risk, the factors that precipitate most accidents are at some point under an organization's or an individual's control. Therefore, most chemical accidents and the damage they cause are by definition preventable.

Hazardous materials prevention is not new. For many years, federal and state governments have issued regulations governing workplace safety, transportation safety, and environmental safety. Communities have assessed local hazards, managed land use, enforced safety codes, and conducted public education activities. Businesses have implemented safety programs to protect worker health and minimize the potential for accidental releases of and exposures to toxic substances.

The benefits to communities and employers of well-designed prevention programs have proven to be significant. These benefits include reductions in hazardous materials incidents and accidents; fewer deaths and injuries to workers and citizens; improvements in employee skills, productivity, and morale; lower insurance and operating costs; decreased damage and cleanup costs; elimination of regulatory penalties; and protection against litigation. As FEMA notes in its Strategic Plan (FY 1998-2007), "no other approach is as effective over the long term."

Although the concept of prevention is well established, the practice of making safety a primary focus of production and emergency management may be new to some organizations. Prevention requires identifying safety as a basic goal and priority of hazardous materials operations. The objective is accomplished through formal programs that incorporate a systematic analysis of potential hazards, a comprehensive effort to eliminate or minimize risk, and activities that foster a safety culture among workers and the public.

A key element of this new emphasis on prevention is the concept of a **public/private sector partnership** to promote hazardous materials safety. Increasingly, communities, businesses, and professional associations recognize the mutual benefits of cooperation and coordination in prevention program planning and development. For example, FEMA's concept of ***Disaster Resistant Communities*** aims to bring together private industry, insurance providers, mortgage lenders, the real estate industry, homebuilding associations, citizens, and others to create model communities in high-risk areas. Other federal initiatives strive to promote understanding and cooperation between government and industry, and to simplify unnecessarily burdensome and confusing regulations.

Everyone who can affect hazardous materials prevention has a role in this partnership. The federal government establishes minimum safety standards, provides incentives and guidelines for compliance, conducts inspection and enforcement activities, and supplies assistance and resources, including training. State governments serve as a conduit for federal programs, and provide supplementary programs, regulations, and assistance. Local jurisdictions identify and assess hazards, develop prevention strategies and plans that address community needs, and implement programs to enforce safety standards and protect the public health.

General Training Issues

Although government plays a key role in prevention, organizations that process, store, handle, and transport hazardous materials are in the best position to actually eliminate or mitigate against accidents. Employers in both the public and private sectors are ultimately responsible for the safety of chemical operations and for coordinating prevention activities within the community. They accomplish these goals through programs and activities that are appropriate to the hazards involved and in full compliance with legal requirements.

The general public also has a role in hazardous materials prevention. With adequate information, community groups, professional associations, and individual citizens can provide valuable support and resources to government prevention programs and initiatives. They also contribute to hazardous materials prevention by preparing individual and family preparedness plans that address household chemicals, and by maintaining safe homes and workplaces.

In addition to the concept of a public/private partnership, other aspects of this new philosophy on prevention include the following:

- A focus on safety must be evident during the complete life cycle of hazardous materials, from design and testing to production, storage, transportation, use, treatment, and disposal. This approach implies methods to systematically evaluate entire operations, as well as comprehensive programs that address all phases of production and transportation operations.

- Organizations that use hazardous materials should first attempt to eliminate the *possibility* of accidents or exposures by substituting inherently safer technologies or less hazardous substances in existing operations. If this approach is not feasible, other measures should be considered to reduce the *probability* or *severity* of accidents.

- Communities and employers should recognize that costs for prevention may not be extensive, and many measures will pay for themselves over time. Costs and benefits should be established early in the planning process, even though it may be difficult to estimate savings that accrue by avoiding accidents and exposures.

- Safety management techniques and technologies are continually evolving. When possible, communities and professional associations should promote activities that foster research, information sharing, technology transfer, and the development of a supportive regulatory and economic environment for organizational innovation.

Prevention Legal Authorities

Hazardous materials safety efforts have expanded over the last two decades with the addition of numerous laws, regulations, and standards. These legal authorities address separate pieces of the hazardous materials problem, and are administered by different agencies at all levels of government.

On the community level, planning for prevention is often considered a natural extension of state and local governments' responsibility for developing emergency operations plans. In effect, planning team members "piggyback" and expand on the hazards analysis conducted for response planning to prepare prevention strategies and plans. These materials are often incorporated as an annex to the community's emergency operations plan. A number of federal laws, regulations, and guidelines apply to this process. (For more information, see the *Hazardous Materials Planning Curriculum Guidelines*.)

- Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)
- OSHA Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)
- Resource Conservation and Recovery Act (RCRA)
- FEMA Emergency Operations Plan Requirements (44 CFR Part 302)
- Guide for All-Hazard Emergency Operations Planning (FEMA SLG 101)
- Hazardous Materials Emergency Planning Guide (NRT-1)
- Technical Guidance for Hazards Analysis (EPA/FEMA/DOT)
- Handbook of Chemical Hazard Analysis Procedures (FEMA/DOT/EPA)

Public and private sector facilities that store, handle, or transport certain types and quantities of hazardous materials are also subject to federal contingency planning regulations. Although different requirements may apply to different facilities and operations, the National Response Team's Integrated Contingency Plan (ICP) Guidance provides a format for complying with the various planning regulations in one functional emergency response plan. Annex 7 of the ICP addresses prevention-based requirements that are specified in the regulations or that may impact response activities. (For more information, see the *Hazardous Materials Planning Curriculum Guidelines*.)

Federal statutes, regulations, and national codes that specifically address hazardous materials prevention safety are listed below and described further in Appendix A:

- Hazardous Materials Transportation Act
- Hazardous Materials Transportation Uniform Safety Act
- Hazardous Materials Regulations (49 CFR Parts 171-180)
- The Occupational Safety and Health Act of 1970
- OSHA Process Safety Management of Highly Hazardous Chemicals (29 CFR 1910.119)
- OSHA Hazard Communication Standard (29 CFR 1910.1200/1926.59)
- OSHA Safety and Health Program Management Guidelines (Federal Register 54(18):3908-3916, January 26, 1989)
- The Clean Air Act Amendments of 1990 (Public Law 101-549)
- EPA Accidental Release Prevention Requirements: Risk Management Programs Under Clean Air Act, Section 112(r)(7) (40 CFR Part 68)

In addition to these authorities, the *Occupational Safety and Health Act of 1970* encourages states to develop and operate their own job safety and health plans. States with plans approved under section 18(b) of the law must adopt standards and enforce requirements that are at least as effective as federal requirements. Many local jurisdictions also adopt specific policies, regulations, and codes that affect hazardous materials prevention requirements. As a result, agencies and facilities with a role in hazardous materials prevention are encouraged to thoroughly research state and local authorities during program analysis and planning.

Finally, jurisdictions adopt and enforce standards and codes that define safe practices and procedures in the use of hazardous materials. These codes may govern design and construction of buildings, fire prevention, land use planning (zoning and occupancy), employee safety, accident prevention, public health, environmental quality, and related areas. Several important national codes developed by cognizant professional associations are described in Appendix A.

Prevention Programs

The key to prevention programs is improving the safety of methods used to store, transport, handle, and process hazardous materials. This is true whether the requirement exists in business and industrial operations or in government managed facilities (water treatment plants, sewer systems, utilities, etc.). Broad strategies and methods for accomplishing this goal include:

1. Use of less hazardous alternatives. Examples of this approach include the use of inherently safer technologies, substitution of non-toxic or less toxic materials, reassessment of plant layout to isolate hazardous substances, and reduction of chemical stockpiles through efficient management of inventory.

2. Engineering controls. Examples of engineering controls commonly used in hazardous materials operations include ventilation systems, containment systems, detection and monitoring systems, robotic controls, physical barriers, isolation controls, electrical protection, sprinklers, and pollution control technologies.

3. Safety information. Accurate safety information must be accessible by all end users, including secondary processors, distributors, transporters, contractors, and workers. Tactics used to accomplish this objective include employee training, labeling and placarding, and process safety information management systems. Establishing an effective labor-management dialogue on safety is also important.

4. Standard operating guidelines (SOGs). These guidelines distill the analysis conducted during the hazard assessment, systems design, and safety planning phases into job-specific procedures and worker performance standards and expectations. Development and enforcement of SOGs define and implement safe working practices for each hazardous materials application.

5. Administrative actions. Personnel management systems and procedures often have great potential for enhancing prevention, often at little cost. Examples include reducing employee shift length, cross-training, or rotating employees to keep them alert; improving security and access control systems; modifying maintenance and housekeeping schedules and procedures; identifying safety as a factor in organizational goals and objectives, worker performance reviews, and management incentives; and integrating planning with the community and local health care facilities.

6. Personal protective equipment. When exposure is less controllable, adequate personal protective equipment (PPE) and related training must be made available. Examples of PPE include chemical resistant gloves, aprons, face shields, respiratory protection, etc.

Although prevention is first and foremost a responsibility of hazardous materials users, government oversight agencies, insurance companies, professional associations, community groups, and others can do much to promote safety. Examples of activities used to motivate and support facilities and transporters in prevention include:

- Legislation, regulations, and standards that clarify prevention requirements and programmatic guidelines
- Community right-to-know policies and information management systems
- Land use planning and zoning (set back, density, relocation, land acquisition, etc.)
- Plans review and permitting programs for building and operational systems designs
- Inspections and enforcement of hazardous materials and other safety codes
- Environmental and hazard monitoring systems
- Public education and information activities
- Disaster insurance (premium reductions, criteria for coverage, etc.)
- Tax incentives/disincentives and financial resources
- Methods to foster improved public/private sector coordination and cooperation
- Research and information dissemination

Obviously, the concept of prevention covers a broad spectrum of strategies and tactics conducted by many different types of organizations. The nature of prevention programs is equally diverse, depending on such factors as the mission of the organization, the types and quantities of chemicals involved, financial and personnel resources, legal requirements, etc. However, all prevention programs should be based on a thorough hazard assessment, and include a comprehensive and systematic program planning process appropriate to the organization's needs.

Exhibit 1, *Prevention Program Model*, identifies common functional elements of prevention programs. These elements are derived from a review of federal regulations and guidelines (see Appendix A), with emphasis on OSHA's *Process Safety Management Standard*. Although each organization will tailor this program model to its own needs, the exhibit demonstrates the potential scope of prevention activities. The model also is useful as a conceptual framework for program planning and for identifying training audiences and instructional requirements.

Exhibit 1
PREVENTION PROGRAM MODEL

1.0 Prevention Program Analysis and Planning
- 1.1 Review of Authorities and Statutory Mandates
- 1.2 Hazards Analysis
- 1.3 Program Planning
- 1.4 Program Implementation, Evaluation, and Maintenance
- 1.5 Interagency Coordination and Cooperation

2.0 Employee Participation, Education, and Training
- 2.1 Employee Participation
- 2.2 Employee Education and Training

3.0 Process Design, Plans Review, and Construction
- 3.1 Facility and Systems/Process Design and Construction
- 3.2 Transportation and Storage Design and Construction
- 3.3 Plans Review and Permitting

4.0 Safety Systems
- 4.1 Pre-Startup Safety Reviews
- 4.2 Maintenance/Mechanical Integrity
- 4.3 Management of Change

5.0 Process Operations
- 5.1 Systems/Process Safety Information
- 5.2 Operating Guidelines and Practices
- 5.3 Contractor Safety

6.0 Compliance
- 6.1 Safety Inspections, Investigations, and Enforcement
- 6.2 Compliance and Safety Audits
- 6.3 Recordkeeping and Reporting

7.0 Public Information and Education
- 7.1 Public Awareness/Prevention Communication
- 7.2 Family and Individual Preparedness

General Training Issues

PREVENTION TRAINING AND EDUCATION

Rationale for Prevention Training and Education

Of all prevention strategies, training and education programs may be the most effective. Well-designed training programs significantly reduce the number and severity of incidents arising from process operations, and help prevent small problems from leading to a catastrophic release. The Department of Transportation notes simply that "training is the best means of preventing hazardous materials accidents" (*Training For the Safe Transportation of Hazardous Materials*, RSPA, 1997).

Why is training so effective? Studies have identified as among the barriers to effective prevention programs:

- Inadequate information about chemical hazards, the causes of accidents, safer technologies, and related costs.
- A lack of managerial awareness and expertise about preventive measures and regulatory requirements.
- Organizational obstacles based on corporate attitudes.
- Limited communications among public officials, employers, and workers.
- Inadequate employee and citizen knowledge about safety and prevention.

An effective method for addressing all of these problems is training and education programs targeted to the various groups with a role in prevention. Training programs increase employee awareness of hazards and help workers understand the nature and causes of potential problems. They provide opportunities for individuals to learn and practice safety systems and procedures in a risk-free environment. And they contribute to the development of a safety culture within the organization that motivates worker participation in hazard identification, program planning, safety audits, incident reviews, and other prevention activities.

Training is also critical for public officials, executives, managers, and others not directly involved in hazardous materials operations. Promoting change within organizations is most effective when the process starts at the top. Shifting the traditional focus from productivity and emergency preparedness to prevention requires changing the mindset of decision-makers in government, business, and industry. The same is true for design professionals and technical experts—architects, engineers, consultants, etc.—that plan operational systems and contribute to policy development.

Recognizing the importance and benefits of prevention training, OSHA, DOT, EPA, and other federal agencies have identified training requirements and guidelines for hazardous materials employers. General requirements are summarized in Appendix B; training managers may need to research more specific mandates for different industrial sectors and employer types.

Prevention Training Challenges

Although hazardous materials prevention training is mandated by law, and the potential benefits are well established, too few organizations place an adequate emphasis on this safety strategy. Several reasons exist for this state of affairs:

1. The benefits of prevention are often poorly understood and difficult to quantify. As a result, some organizations place a low priority on prevention initiatives, including training. This is especially true in smaller commercial operations, where safety information is limited and resources are tight.

2. Traditionally, employee training has focused on improving productivity, with prevention viewed as an adjunct to workers' primary job responsibilities. Thus, prevention training is not usually identified as a separate requirement or curriculum area, with the attention and resources it deserves.

3. Workplace safety is not identified as a separate competency in many professional schools of business management, architecture, engineering, public administration, etc. Opportunities to deliver prevention training to these key audiences may be limited.

4. An emphasis on hazardous materials safety as a primary objective of training is relatively new. Few course materials exist, and instructional guidelines for training managers, course developers, and instructors may be lacking or inadequate.

5. Prevention covers a very broad range of possible subject areas and audiences. The resulting scope of training program requirements can be overwhelming for some communities and facilities.

6. Prevention training is often highly technical and complex. Opportunities should be provided for students to practice key skills in a realistic but safe environment. As a result, training delivery often benefits by the use of specialized facilities and equipment that are beyond the resources of some organizations.

7. Recruitment for training activities can be difficult because organizations and audience members may place a low priority on prevention, or view prevention as an ancillary duty to primary work responsibilities.

How individual training managers deal with these challenges will depend on the organizational situation they face—management priorities, training requirements, safety concerns, resources, etc. However, three general principles can be stated: (1) educational activities designed to heighten the awareness of decision-makers about the organizational benefits of prevention should be considered early in program planning; (2) a comprehensive prevention training needs assessment should be prepared to identify priorities, appropriate training methodologies, and techniques for demonstrating competence; and (3) whenever possible, employee participation should be encouraged in the training development process.

THE PREVENTION CURRICULUM GUIDELINES

Organization of the Curriculum

The ultimate goal of the Prevention Curriculum is to improve safety in hazardous materials operations, thereby reducing the probability and severity of accidents and exposures. This goal is accomplished by enhancing participants' motivation and ability to develop and implement effective prevention programs and activities within their organizations. Instruction is intended to supplement, not replace, other job-specific education and training that audience members receive in their primary work functions.

The Prevention Curriculum addresses the training needs of two broad audience groups: persons who conduct hazardous materials operations, whether in the public or private sectors; and persons responsible for government and other oversight and enforcement programs to protect worker and citizen health. At this time, the general public is not identified as a curriculum audience, although personnel responsible for public information and education activities are included.

The Prevention Curriculum is organized into seven audience categories based on commonalties in knowledge and skill requirements. These categories are briefly described below; more detailed information on each is presented in the following sections.

Prevention Awareness describes the introductory training requirements of all audiences in the Hazardous Materials Prevention Curriculum. Instruction is intended to give participants general knowledge about prevention that can serve as a foundation for subsequent job-specific training. The audience includes anyone who has responsibilities in hazardous materials prevention or could influence prevention efforts at state and local levels. Participants are provided with 1) an introduction to basic prevention terminology and concepts, 2) an explanation of individual and organizational roles in prevention, and 3) an overview of common prevention methods and activities.

General Training Issues

Prevention Policy Development describes the training requirements of persons who direct, manage, or own organizations that use hazardous materials—chief executives and senior managers from a broad spectrum of government, private sector, and non-profit organizations. In this role, audience members oversee the development and maintenance of the prevention program, and direct staff and others who implement the program on a day-to-day basis. They have the organizational authority to develop and enforce prevention program policies and to budget and expend related funds.

Prevention Program Management describes the training requirements of persons who develop or manage prevention programs and related activities for organizations that use hazardous materials. Individuals in this category are responsible for ensuring worker and public safety in hazardous materials operations, and for implementing the organizational policy and direction established by senior managers. The training audience consists of supervisory-level personnel in hazardous materials facilities and transport operations, both public and private. Since training requirements will depend on the size and nature of the operations, the audience is further subdivided as follows:

- Smaller/Less Complex Operations describes the training needs of persons that manage smaller and/or less complex hazardous materials operations, such as retail outlets, small energy distributors, trucking firms, and so forth.

- Larger/More Complex Operations describes the training needs of persons that manage prevention programs for larger producers, processors, and distributors of hazardous materials, including those subject to OSHA's *Process Safety Management (PSM) Standard*.

Community Prevention Program Management describes the training needs of persons who develop and manage state and local government hazardous materials prevention programs and activities (community hazards analysis, prevention planning, land use planning, construction plans review, inspection and codes enforcement, public education, etc.). The training audience includes government officials and others with supervisory-level responsibilities in community hazardous materials prevention—state environmental agency prevention managers, HMEP program managers, local response agency (fire, law enforcement, emergency medical services) prevention managers, hazardous materials planners, zoning board members, codes enforcement managers, emergency management program directors, and other community representatives.

Prevention in Operations describes the training requirements of persons who regulate, respond to, supervise or operate systems or processes that involve the use of hazardous materials. These employees are responsible for ensuring that hazardous materials prevention activities and safety requirements defined in safety management plans and SOGs are properly implemented and enforced. The training audience includes employees of public, private, and non-profit facilities, including large and small operations at industrial plants, commercial establishments, trucking and other transport companies, government agencies, health care operations, utilities, and many other types of organizations.

Design and Plans Review describes the training needs of persons who oversee and participate in the design, planning, approval, and construction of hazardous materials operations (plants, buildings, processing systems, equipment, etc.). Individuals performing this function are responsible for incorporating the requirements and recommended practices contained in prevention codes and standards into detailed plans, specifications, instructions, and other documents. The training audience includes members of the design team and community officials who oversee the process. A secondary audience includes persons that implement the approved design (procurement personnel, contractors, vendor representatives, production operators, etc.)

Inspection and Enforcement describes the training needs of persons who monitor, inspect, and evaluate safety in hazardous materials operations. In this role, audience members 1) identify risks and prevention opportunities associated with specific operations, and 2) assess and enforce compliance with established authorities and codes. The audience includes inspectors and enforcement officials from community agencies (fire service, police, health agency, etc.), and individuals with similar roles in public, private, and non-profit organizations (safety officers, production managers, shift supervisors, insurance company representatives, consultants, etc.).

Use of the Guidelines

The following section of the *Prevention Curriculum Guidelines* identifies training requirements for each audience category defined above. This analysis is presented in the form of detailed terminal and enabling instructional objectives that define basic competencies audience members need to successfully perform their prevention responsibilities. Narrative information describing each curriculum area—purpose of training, target audiences, subject matter content, and recommended training methodologies—is included.

The training requirements identified here are compatible with the prevention philosophies and strategies contained in federal regulations and guidelines (see Appendix A) and other respected studies. However, the curriculum model is necessarily general in nature. State and local training managers will have to match the unique roles and responsibilities of their personnel with the categories in the model, or tailor the model to meet their specific needs. Assistance in this process will be addressed in the *Guidelines for Training Program Management* section of subsequent editions of this manual.

To minimize confusion, some important terminology is clarified below.

- "Accidental releases," "accidents," "incidents," and "events" are used interchangeably to define emergency situations that have the potential for adverse effects on human health, property, and the environment.

- The terms "operations" and "system/process" are broadly defined to mean any activity involving a hazardous chemical, including the storage, manufacturing, processing, handling, on-site movement, or transportation of such materials.

- "Hazards assessment" and "hazards analysis" are used interchangeably to describe the general process of identifying, categorizing, and assessing the risk of hazardous materials accidents and exposures. The specific approach used for this process will depend upon organizational needs, resources, and preferences.

- "Risk" means the potential losses associated with a hazard and is defined in terms of expected probability, frequency, magnitude, severity, exposure, and consequences.

- "Facility" is broadly defined to include the buildings, containers, and equipment that house a hazardous materials operation or system/process .

Hazardous Materials

Prevention Training Guidelines

Prevention Awareness

General Training Considerations

Introduction

Prevention Awareness describes the introductory training requirements of all audiences in the Hazardous Materials Prevention Curriculum. Instruction in this area is intended to give participants a general knowledge base about prevention that can serve as a foundation for subsequent job-specific training.

The goal of Prevention Awareness training is to enhance participants' understanding of the importance and benefits of prevention, and to motivate them to seek additional information and assistance as needed. This goal is accomplished by providing students with 1) an introduction to basic prevention terminology and concepts, 2) an explanation of individual and organizational roles in prevention, and 3) an overview of common prevention methods and activities.

(Note: As defined here, Prevention Awareness is a common training requirement for all audiences, not a unique audience category. This material would typically be included in training delivered to each of the audiences described in the following sections. It is presented as a separate category to minimize redundancy and to facilitate use for mixed audiences, non-hazmat workers, and the general public.)

Audience

The training audience for Prevention Awareness includes everyone that has responsibilities in hazardous materials prevention or could influence prevention efforts at the state and local levels. Specifically included are employees of hazardous materials facilities, transportation workers, and personnel in agencies and organizations that implement the community's prevention policies and plans. Other workers and the general public will also benefit by awareness training in prevention. Potential audiences include union members, employee groups, civic organizations, volunteer agencies, activist groups, etc.

Training Requirement

Prevention Awareness training includes generic information about prevention and the community's prevention system. Also included is a general orientation to the student's work requirements and expectations. More specific knowledge and skills are defined for different audience groups in subsequent sections of these *Guidelines*.

At the conclusion of training, participants should be able to describe the hazardous materials prevention system as it applies to them, their responsibilities in that system, and ways to get further assistance. Possible content areas include:

Relevant technological hazards
Applicable laws, regulations, and codes
Common prevention strategies and activities
Community and organizational plans, roles, and activities
Sources of prevention information and training

Methodology Recommendations

Prevention Awareness training can usually be delivered in one to three hours of classroom instruction. Content is typically presented as an introductory module in a broader training program for a specific audience group, although stand-alone training is possible. This type of awareness-level training can also be presented through the use of written materials and instructional media, a strategy that is particularly cost-effective for large and dispersed audiences. Other recommendations and considerations include the following:

- Training should emphasize the jurisdiction's strategies and methods for creating a disaster resistant community, and encourage the coordination and cooperation of government agencies and private sector organizations in hazardous materials prevention.

General Training Considerations

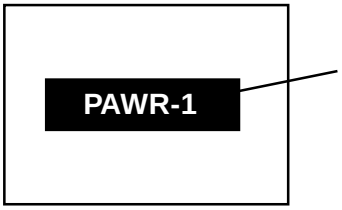
- Heterogenous audiences for Prevention Awareness training provide the opportunity for cross-disciplinary information sharing and networking among participants.
- Appropriate instructional methodologies include case studies, discussions, and small group activities to promote participant interaction and individual action planning.
- Although the bulk of Prevention Awareness training is by definition generic, some tailoring of course materials to specific audiences may be beneficial to account for differences in community hazards, prevention strategies and systems, job requirements, etc.
- The use of instructional media (videotapes, slides, graphics, etc.) to enhance the impact and efficiency of training is particularly appropriate for this audience.

Recommended Training

Recommended Training
Prevention Awareness

Two types of statements are used to describe training requirements recommended for Prevention Awareness. Terminal objectives identify broad job competencies. Enabling objectives describe instructional accomplishments intended for a training (generally a classroom) environment. Together, these statements define generic training needs for all audience members. Hazardous materials training managers are encouraged to expand upon and refine this material to clarify the training requirements of specific audience groups.

The training objectives presented in the next section are consistent with federal requirements and national standards established for hazardous materials prevention. Included are FEMA and NRT prevention program planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA Accidental Release Prevention Requirements, and guidance disseminated by the chemical industry.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as PAWR-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
PAWR-1	Given the hazards in a specific jurisdiction, describe the purpose and benefits of hazardous materials prevention.
PAWR-1.1	Define hazardous materials prevention, and describe the benefits of hazardous materials prevention programs.
PAWR-1.2	Define Comprehensive Emergency Management (CEM) and the integrated approach to hazardous materials prevention.
PAWR-1.3	Describe the nature of technological hazards facing the community.
PAWR-1.4	Describe the concept of disaster resistant communities.
PAWR-2	Describe relevant aspects of a hazardous materials prevention system.
PAWR-2.1	Identify key legislation, regulations, and policies governing hazardous materials prevention.

PAWR-2.2	Identify the roles and general responsibilities of federal, state, and local government agencies and private sector organizations in hazardous materials prevention.
PAWR-2.3	Describe the prevention planning process and participants.
PAWR-2.4	Identify the roles and general responsibilities of workers and citizens in hazardous materials prevention.
PAWR-2.5	Describe major prevention strategies, activities, and how these should be developed in the emergency operations plan and prevention plans.

PAWR-3 Given this model hazardous materials prevention program, describe common prevention activities.

PAWR-3.1	Describe activities associated with Prevention Program Analysis and Planning: Review of authorities and statutory mandates Hazard analysis Program planning Program implementation, evaluation, and maintenance Interagency coordination and cooperation
PAWR-3.2	Describe prevention activities associated with Employee Participation, Education, and Training: Employee participation Employee education and training
PAWR-3.3	Describe prevention activities associated with Design, Plans Review, and Construction: Facility and systems/process design and construction Transportation and storage design and construction Plans review and permitting
PAWR-3.4	Describe prevention activities associated with Safety Systems: Pre-startup safety reviews Maintenance/mechanical integrity Management of change
PAWR-3.5	Describe prevention activities associated with Operations: System/Process safety information Operating guidelines and practices Contractor safety
PAWR-3.6	Describe prevention activities associated with Compliance and Enforcement: Safety inspections, investigations, and enforcement Compliance and safety audits Record keeping and reporting
PAWR-3.7	Describe prevention activities associated with Public Information and Education: Public awareness/prevention communication Family and individual preparedness

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General Training Considerations

Introduction

Prevention Policy Development describes the training requirements of persons who direct or manage organizations that have defined responsibilities in hazardous materials prevention. In this role, audience members initiate and oversee the development and maintenance of the prevention program's mission statement, policies, strategies, goals, objectives, plans, activities, and administrative systems.

In their jobs, audience members direct staff and others who manage and implement prevention programs and activities. Tasks include initiating and directing the development of prevention programs, setting related policy, establishing priorities based on cost/benefit analyses and other information, allocating staff and resources, approving and monitoring plans, supporting program implementation and evaluation, and ensuring interagency liaison and coordination.

Training Audience

The training audience for Prevention Policy Development consists of chief executives and senior managers from a broad spectrum of public, private, and nonprofit organizations. Potential audience members include city and county elected and appointed officials, SERC and LEPC members, facility owners and managers, police and fire chiefs, planning commissioners, school boards, managers of financial institutions, hospital administrators, media executives and station managers, and officers of professional groups, fraternal organizations, and unions.

The training audience should reflect persons who have the organizational authority to develop and enforce prevention program policy and to budget and expend related funds. Some students, especially in smaller jurisdictions and organizations, will also have responsibility for supervising and implementing specific prevention programs and activities. Individuals with dual responsibilities may need additional training, described under Prevention Program Management, below.

Training Requirement

Persons responsible for Prevention Policy Development represent a broad range of organizations, with very different prevention program needs and resources. Thus, the job requirements of individual audience members may differ, sometimes dramatically. However, all students will benefit by awareness-level training in hazardous materials prevention concepts, techniques, and applications. Many also need training that is specific to their unique organizational and prevention program responsibilities (e.g., type of operations, legal and regulatory requirements, management systems, etc.).

As a prerequisite for training, students are assumed to already possess the management skills, technical support, and resources they need to carry out their assigned organizational responsibilities. Thus, the goal of training is to motivate effective prevention program leadership, promote prevention program excellence, and contribute to the development of a disaster resistant community by providing students with a heightened awareness of:

- The risks posed by hazardous materials to the community and the organization.
- The benefits of prevention programs and activities.
- Strategies and options for hazardous materials prevention.
- Organizational and individual roles and responsibilities in hazardous materials prevention.
- Related administrative and resource requirements.

Training Methodology Recommendations

Generic training that is appropriate for all audience members can usually be accomplished in one to three hours. Content should emphasize 1) the jurisdiction's strategy for developing and implementing prevention programs that contribute to the development of a disaster resistant community, and 2) the organization's and student's role in that system. Audiences should be heterogeneous whenever possible, reflecting the contribution of different types of organizations to the community's hazardous materials prevention system.

General Training Considerations

More training may be necessary to address the unique needs of different audience members, covering, for example, specific organizational hazards, regulatory requirements, prevention program activities, etc. If so, training managers should group students and tailor training accordingly. Instruction must be presented in such a way that nonspecialists can acquire the information they need to make informed management-level decisions.

Other training methodology recommendations and considerations include the following:

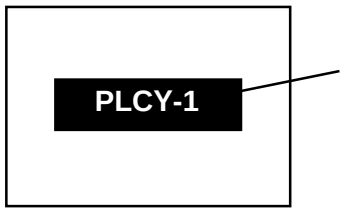
- Training should emphasize the jurisdiction's strategies and methods for developing a disaster resistant community, and encourage the coordination and cooperation of government agencies and private sector organizations in hazardous materials prevention.
- Instructional methodologies should include discussions and small group activities that promote participant interaction and support the resolution of conflicts.
- Course materials for heterogeneous audiences should include examples of prevention activities from various types of organizations, e.g., government agencies, public utilities, chemical transporters, industrial production facilities, hospitals, sewage treatment facilities, truck stops, and pipelines.
- The use of instructional media (videotapes, slides, overhead transparencies, etc.) to enhance the impact and efficiency of training is particularly appropriate for this audience.
- Special efforts may be needed to recruit students due to the nature of their organizational positions and the low priority sometimes afforded prevention programs and training.

Recommended Training

Prevention Policy Development

Two types of statements are used to describe training requirements recommended for Prevention Policy Development. Terminal objectives identify broad job competencies. Enabling objectives describe instructional competencies that lead to proficiency in the terminal objective. Together, these statements identify generic training needs for all audience members. Hazardous materials training managers are encouraged to refine this material as necessary to clarify the training requirements of different audience groups (e.g., large chemical facility executives, LEPC members, hospital administrators, etc.).

The training objectives presented in the next section are consistent with federal requirements and national standards. Included are FEMA and NRT planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA requirements, and guidance disseminated by the chemical industry.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as PLCY-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
PLCY-1	Given an over view of prevention concepts and activities (see *Prevention Awareness*), analyze the organization's prevention program mission, policies, goals, objectives, strategies, activities, and plans.
PLCY-1.1	Describe guidelines for researching and assessing hazardous materials prevention authorities and statutory mandates.
PLCY-1.2	Describe guidelines for identifying and analyzing technological hazards, vulnerabilities, and risks.
PLCY-1.3	Describe guidelines for developing or refining the organization's hazardous materials prevention program mission statement and policies.
PLCY-1.4	Describe guidelines for developing or refining the prevention program's short- and long-term goals, measurable objectives, and evaluation criteria.
PLCY-1.5	Describe guidelines for identifying and analyzing prevention program strategies and activities.
PLCY-1.6	Describe guidelines for preparing and coordinating short- and long-range prevention program plans.

PLCY-1.7 Describe common prevention program implementation shortfalls and opportunities.

PLCY-2 Given the program strategy and plans, identify administrative systems and resources needed to implement the program.

PLCY-2.1 Describe guidelines for determining the scope of the prevention program's administrative and resource requirements.

PLCY-2.2 Describe guidelines for assessing existing personnel, available resources, organizational capabilities, competing requirements, and staffing alternatives.

PLCY-2.3 Describe possible funding resources and alternatives.

PLCY-2.4 Describe methods to assess organizational impacts (economic, legal, public relations, etc.) resulting from different resource allocation strategies and program outcomes.

PLCY-3 Given implementation of the organization's prevention program, support and sustain evaluation and maintenance of the program.

PLCY-3.1 Describe guidelines for monitoring program activities and measuring progress in implementing prevention strategies.

PLCY-3.2 Describe guidelines for evaluating and refining program systems, strategies, plans, budgets, procedures, etc. to enhance prevention.

PLCY-3.3 Describe guidelines for ensuring long-term compliance with legal requirements and maintaining interagency liaison and coordination.

PLCY-4 Given a review of prevention program needs, identify additional sources of information, assistance, and training.

PLCY-4.1 Assess individual and organizational needs for additional information, assistance, and training.

PLCY-4.2 Identify and describe methods to research and evaluate information, assistance, and training available through government and private sector sources.

Hazardous Materials

Prevention Training Guidelines

Transportation/Facility Prevention Program Management

General Training Considerations

Introduction

Prevention Program Management describes the training requirements of persons who develop or manage prevention programs and activities for hazardous materials facilities. In this context, the terms "transportation/facility" are broadly defined to include governmental (sewage treatment, utilities, etc.), private sector (large and small businesses), and nonprofit organizations that process, store, handle, or transport hazardous materials.

Persons performing Transportation/Facility Prevention Program Management are responsible for ensuring worker and public safety in hazardous materials operations. In this role, they implement the organizational policy and direction established by senior managers (see *Prevention Policy Development*). Tasks include conducting and/or supervising staff and consultants (e.g., architects, engineers, and other technical specialists) in the following types of prevention activities:

- Assisting senior managers in writing prevention policy, establishing prevention goals, designing related administrative systems, assessing budgets, promoting interagency coordination, developing evaluation criteria, and so forth.

- Researching and assessing prevention legal requirements chemical hazards, potential incident impacts, and organizational capabilities.

- Analyzing prevention strategies and options (i.e., activities designed to prevent and mitigate accidental releases of hazardous materials).

- Determining prevention training needs, developing course materials, managing training programs, and delivering instruction.

- Developing prevention program staff plans and schedules, negotiating subcontractor arrangements, assigning personnel, monitoring and evaluating performance, and tracking expenditures.

- Implementing specific prevention activities (e.g., legal research, hazard assessment, operations safety, inventory control, transportation safety, compliance enforcement).

- Monitoring progress, evaluating outcomes, and recommending organizational and programmatic changes to improve safety.

In smaller operations, the distinction between Prevention Policy Development and Prevention Program Management may seem artificial since the same person performs both roles. However, as defined in this training classification, Prevention Program Management requires more specialized knowledge about prevention and greater technical skills. Specifically included are methods for hazards assessment, prevention program planning, prevention systems and procedures development, and prevention activity implementation and evaluation. Persons with dual responsibilities in Prevention Policy Development and Prevention Program Management may need training in both areas.

Training Audience

The training audience for Transportation/Facility Prevention Program Management consists of supervisory-level personnel from organizations that process, store, handle, or transport hazardous materials. Specifically included are large and small operations managed or authorized by federal, state, and local government entities. In some organizations and operations, the role may be identified as a primary job title (e.g., safety officer, risk manager). In others, the responsibility is assumed by management or operations personnel (e.g., production manager, systems manager, lead operator, organizational planner, etc.).

The job and training requirements of individual audience members will vary greatly depending on their roles and responsibilities. For example, the needs of supervisors in facilities that produce large quantities of highly hazardous chemicals will exceed those of employees in smaller retail operations. For this reason, training requirements for this curriculum area have been further subdivided as follows:

- **A: Smaller, Less Complex Operations** describes the training needs of persons that manage the prevention programs of smaller users and distributors of hazardous materials. Operations in these facilities are likely to be relatively simple and subject to fewer regulatory requirements; therefore, related training requirements are also simplified. Organizational examples might include retail outlets, smaller storage facilities, trucking firms, health care facilities, propane and heating oil distributors, etc.

- **B: Larger, More Complex Operations** describes the training needs of persons that manage prevention programs for larger producers, processors, and distributors of hazardous materials. This category typically includes Standard Industrial Classification (SIC) codes commonly associated with the chemical industry, all operations subject to OSHA's Process Safety Management (PSM) standard (29 CFR 1910.119), and major transporters of regulated chemicals. Organizational examples might include larger chemical manufacturers, refineries, raw materials processors, factories, utilities, sewage treatment plants, pipelines, and so forth.

In most communities, the great majority of training audience members fall in Category A. For this group, a more limited awareness and knowledge-based training program is considered appropriate, in contrast to the comprehensive and technical training requirements identified for Category B. However, training managers should recognize that a continuum of instructional needs exists in the real world, and that courses must be tailored accordingly.

Training Requirement

Candidates for instruction in this curriculum area are assumed to already possess basic management skills and expertise in their assigned areas of responsibility (production operations, employee safety, etc.). Thus, the goal of training is to improve leadership and enhance safety programs by providing students with supplementary knowledge and skills in hazardous materials prevention and related activities.

All audience members will benefit by generic training in hazardous materials prevention concepts, techniques, and applications. Possible content areas include:

- The prevention program manager's role and responsibilities.
- The organization's prevention mission and policies.
- State-of-the-art prevention program strategies, concepts, and techniques.
- Methodologies to enhance program planning, implementation, monitoring, and evaluation.
- Problem solving methods and techniques.

However, for instruction to be most effective, audience members should be grouped to the extent possible by prevention program type and the technical requirements of the job. Training can then address any specialized knowledge and skills needed by different segments of the audience. Possible content areas for advanced training include legislative and regulatory requirements, hazard assessment and hazards analysis techniques, planning strategies, and prevention technologies.

Training Methodology Recommendations

General training in Transportation/Facility Prevention Program Management can usually be accomplished in one to three days of instruction. More time may be appropriate for audiences with greater needs. Instructional methodologies should emphasize relevant examples taken from the types of agencies and facilities represented in the audience. Participant activities should highlight innovative approaches to prevention and practical solutions to common problems. Other training methodology recommendations and considerations include the following:

- Training should be placed in context by emphasizing the jurisdiction's strategies and methods for developing a disaster resistant community. Instruction should encourage the coordination of agency and facility efforts to strengthen state and local prevention programs and activities.

General Training Considerations

- Student activities should encourage participant interaction and provide ample opportunities for practice and application of acquired skills. Checklists, job aids, and other practical tools should be included in the course materials.

- Activities should focus on the development of useful work products (e.g., hazards analyses, work plans, program strategies, etc.) under classroom conditions that are as realistic as possible. Methods to transfer learning back to the job should be emphasized whenever possible.

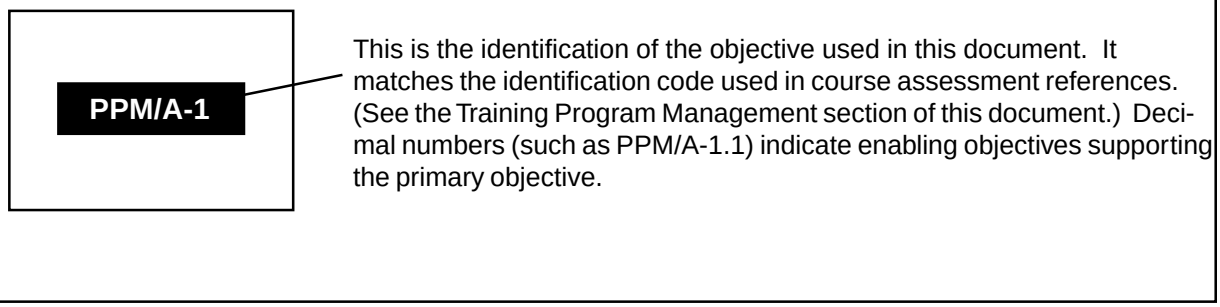
- Instructors need significant practical experience and technical expertise in prevention programs relevant to the audience's needs. Familiarity with state and local program requirements and systems is also important.

Recommended Training

Transportation/Facility Prevention Program Management
Category A: Smaller, Less Complex Operations

Two types of statements are used to describe training requirements recommended for Prevention Program Management. Terminal objectives identify broad job competencies. Enabling objectives describe instructional competencies that lead to proficiency in the terminal objective. Together, these statements identify generic training needs for all audience members. Hazardous materials training managers are encouraged to refine this material as necessary to clarify the training requirements of different audience groups (e.g., retail operations, health care facilities, etc.).

The training objectives presented in the next section are consistent with federal requirements and national standards. Included are FEMA and NRT planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA requirements, and guidance disseminated by the chemical industry.



Identification	***Recommended** Training Objectives*
PPM/A-1	Given an overview of prevention concepts and activities (see *Prevention Awareness*), describe general prevention requirements and guidelines for smaller hazardous materials operations.
PPM/A-1.1	Describe the purpose, applicability, and general requirements of OSHA's General Safety and Health Provisions (29 CFR 1910.20).
PPM/A-1.2	Describe the purpose, applicability, and general requirements of EPA's Accidental Release Prevention Requirements (40 CFR Part 68).
PPM/A-1.3	Describe the purpose, applicability, and general requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200).
PPM/A-1.4	Describe the purpose, applicability, and general requirements of DOT's Hazardous Materials Regulations (49 CFR Parts 171-179).
PPM/A-1.5	Describe the purpose, applicability and general requirements of other federal legislation on regulations that impact prevention in specific training audience organizations.
PPM/A-1.6	Describe the purpose, applicability, and general requirements of state and local regulations and codes governing prevention in smaller operations.

Recommended Training

PPM/A-2 Given an overview of prevention authorities and program options, prepare a hazardous materials prevention program management plan.

PPM/A-2.1 Describe guidelines and methods for researching prevention authorities and statutory mandates.

PPM/A-2.2 Describe guidelines and methods for conducting a hazard assessment, including a worst case analysis and accident history.

PPM/A-2.3 Describe guidelines and methods for preparing and formatting a hazardous materials prevention program management plan for smaller operations.

PPM/A-2.4 Describe guidelines for developing an organizational strategy for prevention program activities that addresses:

- Short- and long-term goals, measurable objectives, and evaluation criteria.
- Analysis of program activities and options.
- Resources and administrative support systems and procedures.
- Staffing assignments and contractor requirements.

PPM/A-2.5 Describe guidelines and methods for coordinating the planning process and communicating results to senior managers and community officials.

PPM/A-3 Given an approved prevention program management plan, conduct and/or supervise the implementation, monitoring, evaluation, and continual refinement of the prevention program.

PPM/A-3.1 Describe strategies and methods for implementing prevention program elements, activities, and procedures.

PPM/A-3.2 Describe strategies and methods for monitoring, evaluating, refining, and continually updating prevention program elements and activities.

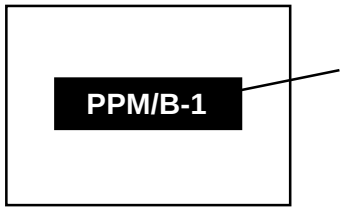
PPM/A-3.3 Describe common shortfalls and opportunities in implementing, evaluating, and maintaining hazardous materials prevention programs.

Recommended Training

Transportation/Facility Prevention Program Management
Category B: Larger, More Complex Operations

Two types of statements are used to describe training requirements recommended for Prevention Program Management. Terminal objectives identify broad job competencies. Enabling objectives describe instructional competencies that lead to proficiency in the terminal objective. Together, these statements identify generic training needs for all audience members. Hazardous materials training managers are encouraged to refine this material as necessary to clarify the training requirements of different audience groups (e.g., retail operations, health care facilities, etc.).

The training objectives presented in the next section are consistent with federal requirements and national standards. Included are FEMA and NRT planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA requirements, and guidance disseminated by the chemical industry.



Objective Identification Legend

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Identification	***Recommended** Training Objectives*
PPM/B-1	Given an overview of prevention concepts and activities (see *Prevention Awareness*), describe general prevention requirements and guidelines for larger hazardous materials operations.
PPM/B-1.1	Describe the purpose, applicability, and general requirements of OSHA's General Safety and Health Provisions (29 CFR 1910.20).
PPM/B-1.2	Describe the purpose, applicability, and general requirements of OSHA's Process Safety Management Standard (29 CFR 1910.119)
PPM/B-1.3	Describe the purpose, applicability, and general requirements of EPA's Accidental Release Prevention Requirements (40 CFR Part 68).
PPM/B-1.4	Describe the purpose, applicability, and general requirements of OSHA's Hazard Communication Standard (29 CFR 1910.1200).
PPM/B-1.5	Describe the purpose, applicability, and general requirements of DOT's Hazardous Materials Regulations (49 CFR).
PPM/B-1.6	Describe the purpose, applicability and general requirements of other federal legislation on regulations that impact prevention in specific training audience organizations.
PPM/B-1.7	Describe the purpose, applicability, and general requirements of state and local regulations and codes affecting hazardous materials prevention.

Recommended Training

PPM/B-2 Given federal, state, and local prevention authorities, conduct and/or supervise research to identify prevention program requirements and related considerations.

- **PPM/B-2.1** Describe guidelines and methods for researching prevention authorities and statutory mandates.
- **PPM/B-2.2** Describe guidelines and methods for organizing staff and consultants to conduct the review of authorities and statutory mandates.
- **PPM/B-2.3** Describe guidelines and methods for reporting and formatting the research results, and for briefing senior managers.

PPM/B-3 Given an analysis of prevention program authorities, conduct and/or supervise a hazards analysis.

- **PPM/B-3.1** Describe guidelines and methods for identifying and categorizing hazards.
  - **PPM/B-3.1.1** Describe guidelines and methods for gathering data on hazardous materials processing, storage, transportation, and handling.
  - **PPM/B-3.1.2** Describe guidelines and methods for categorizing and classifying hazardous materials.
- **PPM/B-3.2** Describe guidelines and methods for assessing vulnerability associated with chemical hazards.
  - **PPM/B-3.2.1** Describe guidelines and methods for identifying varying incident scenarios.
  - **PPM/B-3.2.2** Describe guidelines and methods for assessing vulnerability associated with identified incident scenarios.
  - **PPM/B-3.2.3** Describe guidelines and methods for assessing and correlating organizational emergency response and prevention capabilities with identified vulnerabilities.
- **PPM/B-3.3** Describe guidelines and methods for analyzing potential hazards.
  - **PPM/B-3.3.1** Describe guidelines and methods for analyzing and quantifying potential hazards associated with incident scenarios.
  - **PPM/B-3.3.2** Describe guidelines and methods for prioritizing potential hazards.
- **PPM/B-3.4** Describe guidelines and methods for organizing staff and consultants to conduct a hazards analysis.
- **PPM/B-3.5** Describe guidelines and methods for documenting the hazard assessment results of a hazards analysis, briefing senior managers, and coordinating with other organizations.

PPM/B-4 Given the results of a hazards analysis, identify and assess options for promoting employee participation in prevention activities.

Recommended Training

PPM/B-4.1	Describe legal requirements and guidelines for promoting employee participation and consultation in prevention activities.
PPM/B-4.2	Describe the purpose and benefits of establishing a safety and health committee of employee and management representatives.
PPM/B-4.3	Describe strategies for structuring employee participation in all phases of the safety management process.
PPM/B-5	Given the results of a hazards analysis, identify and assess options for educating and training employees.
PPM/B-5.1	Describe legal requirements and guidelines for prevention education and training.
PPM/B-5.2	Describe guidelines and methods for preparing a prevention program training needs assessment.
PPM/B-5.3	Describe appropriate instructional methods and techniques for various prevention training needs.
PPM/B-5.4	Describe the purpose and benefits of establishing a task force/committee to develop prevention training standards.
PPM/B-5.5	Describe strategies for developing a prevention training plan, preparing courses, and marketing programs.
PPM/B-5.6	Describe strategies for evaluating prevention training programs, certifying competence, and maintaining training records.
PPM/B-6	Given the results of a hazards analysis, identify and assess options for promoting prevention in design and construction.
PPM/B-6.1	Describe legal requirements and guidelines for promoting prevention during design and construction.
PPM/B-6.2	Describe guidelines and methods for evaluating safety performance in the selection of design team members, equipment vendors, and construction personnel.
PPM/B-6.3	Describe strategies for ensuring that prevention issues are adequately addressed in design specifications.
PPM/B-6.4	Describe strategies for enhancing communications and cooperation among community officials, facility managers, and design team members.
PPM/B-6.5	Describe guidelines and methods for monitoring construction and implementation of design plans.
PPM/B-7	Given the results of a hazards analysis, identify and assess options for developing, maintaining, and disseminating process safety information.
PPM/B-7.1	Describe legal requirements and guidelines for developing and maintaining process safety information.

Recommended Training

PPM/B-7.2	Describe types and sources of process safety information commonly compiled, including material safety data sheets (MSDS).
PPM/B-7.3	Describe possible uses of process safety information in prevention activities (hazards analysis, planning, training, enforcement, etc.).
PPM/B-7.4	Describe requirements for labels and other forms of warning appropriate for employee protection.
PPM/B-7.5	Describe strategies for providing access to process safety information by employees and their representatives.
PPM/B-8	Given the results of a hazards analysis, identify and assess options for promoting prevention during operations.
PPM/B-8.1	Describe legal requirements and guidelines for promoting prevention during operations.
PPM/B-8.2	Identify criteria for distinguishing between routine and non-routine operations.
PPM/B-8.3	Describe the content and use of operating procedures and instructions, and how they relate to prevention and safety programs.
PPM/B-8.4	Describe strategies for researching, preparing, and formatting operating procedures and instructions.
PPM/B-8.5	Describe strategies for communicating operating procedures and making them accessible to employees.
PPM/B-8.6	Describe strategies for implementing, monitoring, testing, and periodically reviewing operating procedures.
PPM/B-9	Given the results of a hazards analysis, identify and assess options for promoting contractor safety.
PPM/B-9.1	Describe legal requirements and guidelines for promoting contractor safety.
PPM/B-9.2	Describe facility employer and contractor employer responsibilities for promoting worker safety.
PPM/B-9.3	Describe guidelines and methods for categorizing contract labor according to prevention requirements and responsibilities.
PPM/B-9.4	Describe guidelines and methods for evaluating safety performance and programs in the selection of contractors.
PPM/B-9.5	Describe strategies for informing contract employers about potential hazardous materials risks and applicable provisions of the emergency action plan.
PPM/B-9.6	Describe strategies for developing and implementing safe work practices to control the entrance, presence, and exit of contract employees.

Recommended Training

PPM/B-9.7 Describe strategies for enhancing communications and cooperation between facility managers and contractors about health and safety issues.

PPM/B-9.8 Describe strategies for monitoring and evaluating contractor safety training and job performance, and for maintaining contract employee injury and illness records.

PPM/B-10 Given the results of a hazards analysis, identify and assess options for conducting pre-startup safety reviews.

PPM/B-10.1 Describe legal requirements and guidelines for conducting pre-startup safety reviews.

PPM/B-10.2 Describe strategies for ensuring that design plans are up to date and that construction is in accordance with design specifications.

PPM/B-10.3 Describe strategies for ensuring that initial startup, operating, maintenance, and emergency procedures are in place and adequate.

PPM/B-10.4 Describe guidelines and methods for identifying new training requirements for operating employees and confirming that training has been completed.

PPM/B-11 Given the results of a hazards analysis, identify and assess options for ensuring mechanical integrity of operations equipment.

PPM/B-11.1 Describe legal requirements and guidelines for developing maintenance and mechanical integrity systems and procedures.

PPM/B-11.2 Describe guidelines and methods for identifying, categorizing, and prioritizing equipment and instrumentation for prevention activities.

PPM/B-11.3 Describe strategies for developing quality assurance systems and procedures that address equipment installation, parts replacement, and supplies.

PPM/B-11.4 Describe strategies for developing equipment maintenance procedures and schedules, and for training maintenance personnel.

PPM/B-11.5 Describe guidelines and methods for developing criteria, frequency rates, and procedures for inspections and tests on specified equipment.

PPM/B-11.6 Describe guidelines and methods for determining acceptable equipment test results, documenting the results, and correcting related deficiencies.

PPM/B-12 Given the results of a hazards analysis, identify and assess options for promoting prevention through management of change.

PPM/B-12.1 Define “change” and parameters that determine nonstandard operations.

PPM/B-12.2 Describe legal requirements and guidelines for promoting prevention through management of change.

PPM/B-12.3 Describe guidelines and methods for defining and detecting temporary and permanent change in operations.

PPM/B-12.4 Describe strategies to ensure that equipment and procedures are returned to their original or designed conditions at the end of temporary changes.

Recommended Training

PPM/B-12.5	Describe guidelines and methods to document changes and assure that safety and health considerations are incorporated into operating systems and procedures.
PPM/B-13	Given the results of a hazards analysis, identify and assess options for conducting hazardous materials safety inspections and enforcement activities.
PPM/B-13.1	Describe legal requirements and guidelines for conducting hazardous materials safety inspections and enforcement activities.
PPM/B-13.2	Describe guidelines and methods for establishing criteria and schedules for hazardous materials safety inspections.
PPM/B-13.3	Describe guidelines and methods for conducting safety inspections.
PPM/B-13.4	Describe guidelines and methods for determining acceptable inspection results, documenting the process, and notifying officials.
PPM/B-13.5	Describe guidelines and methods for enforcing compliance with inspection results and correcting related deficiencies.
PPM/B-14	Given the results of a hazards analysis, identify and assess options for conducting compliance safety audits.
PPM/B-14.1	Describe legal requirements and guidelines for conducting compliance safety audits.
PPM/B-14.2	Describe guidelines and methods for evaluating the effectiveness of safety management systems and programs.
PPM/B-14.3	Describe strategies and recommended personnel qualifications for staffing compliance safety audit teams.
PPM/B-14.4	Describe strategies for documenting and disseminating the results of compliance safety audits.
PPM/B-14.5	Describe strategies for ensuring that audit findings and recommendations are addressed and resolved.
PPM/B-15	Given the results of a hazards analysis, identify and assess options for promoting prevention through incident record keeping, reporting, and investigations.
PPM/B-15.1	Describe legal requirements and guidelines for promoting prevention through incident record keeping, reporting, and investigations.
PPM/B-15.2	Describe appropriate data gathering forms and procedures for incident reporting and record keeping.
PPM/B-15.3	Describe appropriate qualifications and experience of the incident investigation team, including requirements for employee participation and training.
PPM/B-15.4	Describe strategies to ensure that prevention concepts and techniques are considered in hazardous materials investigations.

PPM/B-15.5 Describe strategies to ensure that findings and recommendations are addressed and resolved, and that corrective measures are adequately documented.

PPM/B-16 Given an analysis of prevention program activity options, prepare a hazardous materials prevention program management plan.

PPM/B-16.1 Describe guidelines and methods for preparing and formatting a hazardous materials prevention program management plan.

PPM/B-16.2 Describe guidelines for developing an organizational strategy for program activities that addresses:

- Short- and long-term goals, measurable objectives, and evaluation criteria.
- Analysis of program activities and options.
- Resources and administrative support systems and procedures.
- Staffing assignments and contractor requirements.

PPM/B-16.3 Describe guidelines and methods for coordinating the planning process and communicating results to senior managers and community officials.

PPM/B-17 Given a prevention program management plan, conduct and/or supervise the implementation, evaluation, and continual refinement of the prevention program.

PPM/B-17.1 Describe strategies and methods for implementing prevention program elements, activities, and procedures.

PPM/B-17.2 Describe strategies and methods for monitoring, evaluating, and continually refining prevention program elements, activities, and procedures.

PPM/B-17.3 Describe common shortfalls and opportunities in implementing, evaluating, and maintaining hazardous materials prevention programs.

Hazardous Materials

Prevention Training Guidelines

Community Prevention Program Management

General Training Considerations

Introduction

Community Prevention Program Management describes the training requirements of persons who develop and manage state and local government hazardous materials prevention programs and activities. These activities include community hazard analysis, prevention planning, land use planning, construction plans review, inspection and codes enforcement, public education, and other efforts designed to enhance worker and public safety and contribute to the development of a disaster resistant community. (Note: Governmental entities may also be involved in hazardous materials operations—the processing, storage, handling, or transport of regulated chemicals—for example in waste water treatment plants, utilities, medical care facilities, military applications, etc. Training requirements for managers of these types of operations is covered under *Prevention Program Management*.)

Persons performing Community Prevention Program Management are responsible for implementing the organizational policy and direction established by senior managers (see *Prevention Policy Development*). Tasks include conducting and/or supervising staff and consultants (e.g., architects, engineers, and other technical specialists) in the following types of prevention activities:

- Assisting senior managers in writing prevention policy, establishing prevention goals, designing related administrative systems, assessing budgets, promoting interagency coordination, developing evaluation criteria, and so forth.
- Researching and assessing prevention legal requirements, technological hazards, potential incident impacts, and organizational capabilities.
- Analyzing prevention strategies and options (i.e., activities designed to prevent and mitigate hazardous materials incidents).
- Determining prevention training needs, developing course materials, managing training programs, and delivering instruction.
- Developing prevention program staff plans and schedules, negotiating subcontractor arrangements, assigning personnel, monitoring and evaluating performance, and tracking expenditures.
- Implementing specific prevention activities, monitoring progress, evaluating outcomes, and recommending changes to improve safety and program effectiveness.

Training Audience

The training audience for Community Prevention Program Management consists primarily of government officials and others with supervisory-level responsibilities in community hazardous materials prevention. Potential audience members include state environmental agency prevention managers, Hazardous Materials Emergency Preparedness (HMEP) program managers, local response agency (fire, law enforcement, emergency medical services) prevention program managers, hazardous materials planners, zoning board members, codes enforcement managers, emergency management program directors, and other representatives of community organizations that have a defined role in hazardous materials prevention.

Training Requirement

Candidates for instruction in this curriculum area are assumed to already possess basic management skills and expertise in their areas of responsibility (fire prevention, code enforcement, plans review, etc.). Thus, the goal of training is to improve leadership and enhance safety programs by providing students with supplementary knowledge and skills in hazardous materials incident prevention and related activities.

The job and training requirements of individual audience members will vary depending on their roles and responsibilities. For example, the needs of agency officials in large metropolitan areas and rapidly growing jurisdictions may exceed those in smaller, rural, and established communities. However, all audience members will benefit by generic training in hazardous materials prevention concepts, techniques, and applications. Possible content areas include:

- The prevention program manager's role and responsibilities.
- The organization's prevention mission and policies.
- State-of-the-art prevention program strategies, concepts, and techniques.
- Methodologies to enhance program planning, implementation, monitoring, and evaluation.
- Problem solving methods and techniques.

For instruction to be most effective, audience members should be grouped to the extent possible by prevention program type and the technical requirements of the job. Training can then address any specialized knowledge and skills needed by different groups. Possible content areas for advanced training include legislative and regulatory requirements, hazard analysis techniques, planning strategies, and prevention applications.

Training Methodology Recommendations

General training in Community Prevention Program Management can usually be accomplished in one to three days of instruction. More time may be appropriate for audiences with greater needs. Instructional methodologies should emphasize case studies and examples relevant to the audience. Participant activities should highlight innovative approaches to prevention and practical solutions to common problems. Other training methodology recommendations and considerations include the following:

- Training should emphasize the jurisdiction's strategies and methods for creating a disaster resistant community, and encourage the coordination and cooperation of government agencies and private sector organizations in hazardous materials prevention.

- Student activities should encourage participant interaction and provide ample opportunities for practice and application of acquired skills. Checklists, job aids, and other practical tools should be included in the course materials.

- Activities should focus on the development of useful work products (e.g., hazards analyses, work plans, program strategies, etc.) under classroom conditions that are as realistic as possible. Methods to transfer learning back to the job should be emphasized.

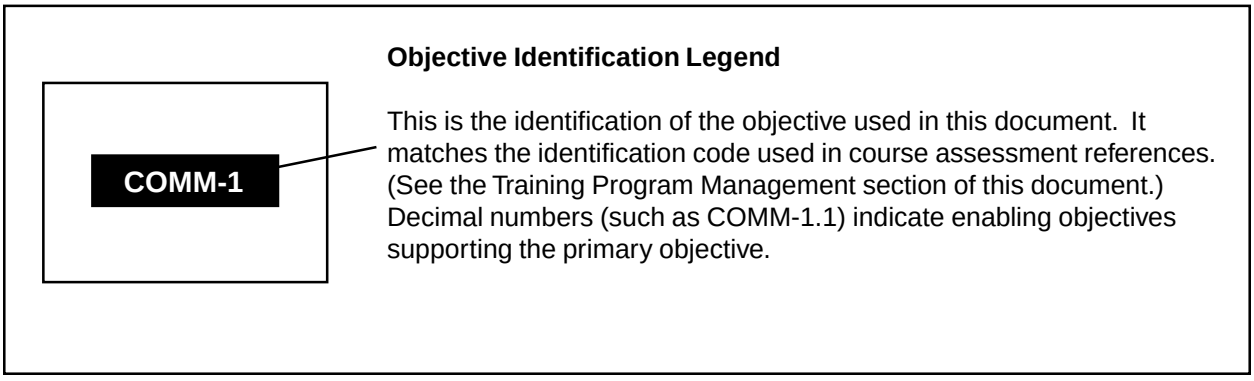
- Instructors need significant practical experience and technical expertise in prevention programs relevant to the audience's needs. Familiarity with state and local program requirements and systems is also important.

Recommended Training

Community Prevention Program Management

Two types of statements are used to describe training requirements recommended for Prevention Program Management. Terminal objectives identify broad job competencies. Enabling objectives describe instructional competencies that lead to proficiency in the terminal objective. Together, these statements identify generic training needs for all audience members. Hazardous materials training managers are encouraged to refine this material as necessary to clarify the training requirements of different audience groups (e.g., retail operations, health care facilities, etc.).

The training objectives presented in the next section are consistent with federal requirements and national standards. Included are FEMA and NRT planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA requirements, and guidance disseminated by the chemical industry.



Identification	***Recommended** Training Objectives*
COMM-1	Given an overview of prevention concepts and activities (see *Prevention Awareness*) and a specific state or local jurisdiction, describe the community's hazardous materials prevention system.
COMM-1.1	Describe general prevention planning guidelines and roles for state and local jurisdictions contained in the following authorities (see *Hazardous Materials Planning Curriculum Guidelines* for more information): • Robert T. Stafford Disaster Relief and Emergency Assistance Act • Title III of the Superfund Amendments Reauthorization Act (SARA) • Guide for All-Hazard Emergency Operations Planning (SLG-101) • Hazardous Materials Emergency Planning Guide (NRT-1) • OSHA 29 CFR 1910.120 and EPA 40 CFR • State and local laws and regulations
COMM-1.2	Describe general prevention guidelines and roles contained in: • State and local legislation, regulations, and policies • State and local emergency operations and prevention plans • State and local planning and zoning ordinances • State and local building, fire, hazardous materials, health, and other codes
COMM-2	Given the community's hazards analysis, identify related prevention program considerations and priorities. (See *Hazardous Materials Planning Curriculum Guidelines* for more information.)

COMM-2.1 Describe the hazards identified in the community's hazards analysis.

COMM-2.2 Describe guidelines and methods for evaluating and refining the community's hazards analysis, if appropriate.

COMM-2.3 Describe guidelines and methods for identifying planning considerations and prioritizing prevention activities to reflect the community's hazard analysis.

COMM-3 Given a community's hazards analysis, identify and assess options for promoting prevention through plans review and permitting programs.

COMM-3.1 Describe community systems and roles for promoting prevention through plans review and permitting programs.

COMM-3.2 Identify hazardous materials regulations, codes, and standards applicable to various design scenarios.

COMM-3.3 Describe guidelines, methods, and procedures for conducting hazardous materials prevention plans reviews and permitting activities, addressing such factors as:

- Consultation with facility management and design team members
- Review of design specifications, plans, and supporting documents
- Construction permitting and licensing (approval)
- Construction monitoring and consultation
- Inspection of new or modified facilities and operations
- Operational permits

COMM-3.4 Describe the essential elements and management requirements of hazardous materials prevention plans review and permitting programs.

COMM-3.5 Describe staffing strategies and recommended personnel qualifications for hazardous materials prevention plans review and permitting programs.

COMM-3.6 Describe guidelines and methods for determining administrative and resource requirements for hazardous materials prevention plans review and permitting programs.

COMM-4 Given a community's hazards analysis, identify and assess options for promoting prevention through inspections and enforcement activities.

COMM-4.1 Describe community systems and roles for conducting hazardous materials inspections and enforcement activities.

COMM-4.2 Describe key authorities governing the processing, storage, handling, and transport of hazardous materials, including:

- OSHA's General Safety and Health Provisions (29 CFR 1910.20)
- OSHA's Process Safety Management Standard (29 CFR 1910.119)
- The Clean Air Act Amendments (1990)
- EPA's Accidental Release Prevention Requirements (40 CFR Part 68)
- OSHA's Hazard Communication Standard (29 CFR 1910.1200)
- DOT's Hazardous Materials Regulations (49 CFR Parts 171-179)
- NRT's Integrated Contingency Plan Guidance

COMM-4.3 Describe guidelines, methods, and information sources for gathering hazardous materials data on facilities and operations, categorizing risks, and establishing priorities among inspection and enforcement requirements.

COMM-4.4 Describe guidelines, methods, and procedures for conducting hazardous materials inspections, addressing such factors as:

- Developing required forms, checklists, questionnaires, etc.
- Scheduling and planning site visits
- Briefing management and operating personnel
- Gathering inspection data
- Assessing the adequacy of plans, permits, process safety information, operating procedures, training, safety systems, etc.
- Identifying deficiencies and concerns
- Documenting and reporting results

COMM-4.5 Describe guidelines, methods, and procedures for enforcing compliance with hazardous materials inspection results (consultation, violation notices, citations, personnel actions, audits, legal actions, etc.).

COMM-4.6 Describe the essential elements and management requirements of hazardous materials inspection and enforcement programs.

COMM-4.7 Describe staffing strategies and recommended personnel qualifications for hazardous materials inspection and enforcement programs.

COMM-4.8 Describe guidelines and methods for determining administrative and resource requirements for hazardous materials inspection and enforcement programs.

COMM-5 Given a community's hazards analysis, identify and assess options for promoting prevention through incident record keeping, reporting, and investigations.

COMM-5.1 Describe community systems and roles for promoting prevention through incident record keeping, reporting, and investigations.

COMM-5.2 Describe appropriate data gathering forms and procedures for promoting incident reporting and record keeping.

COMM-5.3 Describe staffing strategies and recommended personnel qualifications for the hazardous materials incident investigation team, including requirements for training.

COMM-5.4 Describe strategies to ensure that hazardous materials prevention concepts and techniques are adequately considered during incident investigations.

COMM-5.5 Describe strategies for ensuring that hazardous materials incident investigation findings and recommendations are addressed, that corrective measures are adequately documented, and that results are considered in prevention program planning.

COMM-5.6 Describe guidelines and methods for determining administrative and resource requirements for hazardous materials investigations.

COMM-6 Given a community's hazards analysis, identify and assess options for promoting public information and education on hazardous materials prevention.

COMM-6.1 Describe community systems and roles for conducting hazardous materials public awareness/risk communication activities.

COMM-6.2	Describe community systems and roles for conducting individual and family preparedness public education activities in hazardous materials prevention.
COMM-6.3	Describe guidelines and methods for determining audience needs for hazardous materials public information and education activities.
COMM-6.4	Identify and assess communication strategies (media, participants, etc.) for hazardous materials public information and education programs.
COMM-6.5	Identify and assess existing materials and sources of assistance for hazardous materials public information and education programs.
COMM-6.6	Describe the essential elements and management requirements of hazardous materials public information and education programs.
COMM-6.7	Describe staffing strategies and recommended personnel qualifications for hazardous materials public information and education programs.
COMM-6.8	Describe guidelines and methods for determining administrative and resource requirements for public information and education programs and activities.
COMM-7	Given an analysis of prevention program risks, authorities, and activity options, prepare a hazardous materials prevention program management plan. (See *Hazardous Materials Planning Curriculum Guidelines* for more information.)
COMM-7.1	Describe guidelines and methods for preparing and formatting a hazardous materials prevention program management plan.
COMM-7.2	Describe guidelines for developing an organizational strategy for program activities that addresses: • Short- and long-term goals, measurable objectives, and evaluation criteria. • Analysis of program activities and options. • Resources and administrative support systems and procedures. • Staffing assignments and contractor requirements.
COMM-7.3	Describe guidelines and methods for coordinating the planning process and communicating results to community officials.
COMM-8	Given a hazardous materials prevention program management plan, conduct and/or supervise the implementation, monitoring, evaluation, and continual refinement of the prevention program.
COMM-8.1	Describe strategies and methods for implementing prevention program elements, activities, and procedures.
COMM-8.2	Describe strategies and methods for monitoring, evaluating, and continually refining prevention program elements, activities, and procedures.
COMM-8.3	Describe common shortfalls and opportunities in implementing, evaluating, and maintaining hazardous materials prevention programs.

Hazardous Materials

Prevention Training Guidelines

Prevention in Operations

General Training Considerations

Introduction

Prevention in Operations describes the training requirements of persons who supervise or operate processes that involve the storage, transport, handling, manufacture, or use hazardous materials. These employees are responsible for ensuring that hazardous materials prevention activities and safety requirements defined in system/process safety management plans and standard operating guidelines (SOGs) are properly implemented and enforced.

The job requirements and training needs of operations personnel will vary significantly, depending on the size and nature of the operation, the type of hazards involved, the prevention strategy adopted by the facility, and the duties of the employee. However, generic roles and responsibilities can be defined as follows:

- Assist the prevention program manager identify hazardous materials risks, prevention opportunities, and safe operating practices and procedures for specific processes/operations.
- Implement, monitor, and enforce safe working practices and procedures for specific operations.
- Participate in record keeping, reporting, safety reviews, compliance audits, incident investigations, inspections, evaluations, and other prevention program activities.

Training Audience

The training audience for Prevention in Operations consists of employees of public, private, and non-profit facilities. In this context, the terms “facility” and “process” are broadly defined, specifically to include large and small operations at industrial plants, commercial establishments, trucking and other transport companies, government agencies, health care operations, utilities, and many other types of organizations.

The training audience includes a broad spectrum of facility workers, from supervisors of huge chemical production systems to fork lift operators. Audience members include production managers, shift supervisors, line operators, general laborers, hazardous materials transport employees, and many process-specific job titles.

Training Requirement

As a prerequisite of training, students are assumed to already know how to carry out their basic work responsibilities. Thus, the goal of training is to promote hazardous materials incident prevention and employee safety by enhancing participants’ ability and motivation to 1) identify and apply safe working practices and procedures on the job, 2) ensure compliance with established prevention program requirements, and 3) contribute as assigned to related program activities (hazard analysis, planning, record keeping, incident critiques, audits, etc.).

A safety management plan and job-specific SOGs, prepared under the direction of the prevention program manager, should exist for all hazardous materials activities. Instruction in Prevention in Operations therefore emphasizes the knowledge and skills students need to apply these established systems and procedures under varying conditions and in a wide range of routine and non-routine work situations. Specifically included is the ability to implement SOGs that define the student’s prevention responsibilities, and to recognize and report potential safety problems.

Training must be highly specific to each student’s needs, which, in turn, depend on their unique job requirements (type of operations, work responsibilities, associated hazards, prevention strategies, etc.). Therefore, instruction emphasizes the transfer of **operations-specific** knowledge and skills that students need to implement the organization’s prevention program and avoid accidents. General training in prevention concepts and techniques is provided as necessary to support this primary goal.

Training Methodology Recommendations

All students will benefit by awareness-level training in hazardous materials prevention and an understanding of the organization's prevention program. Audience members also need technical knowledge and skills that are specific to their jobs. For this latter type of training, audience members should be grouped to the extent possible by process, hazard, and job type. Training can then be more effectively tailored to the needs of different workers.

Participants should be given opportunities to apply and practice job-specific operating procedures and safety systems under different work conditions and situations. For classroom activities, case studies and scenarios can be used. However, hands-on use of equipment under realistic working conditions and on-the-job training are encouraged. Activities should highlight creative approaches to prevention program requirements and practical solutions to common problems. Drills or exercises under simulated emergency or non-routine situations are also useful.

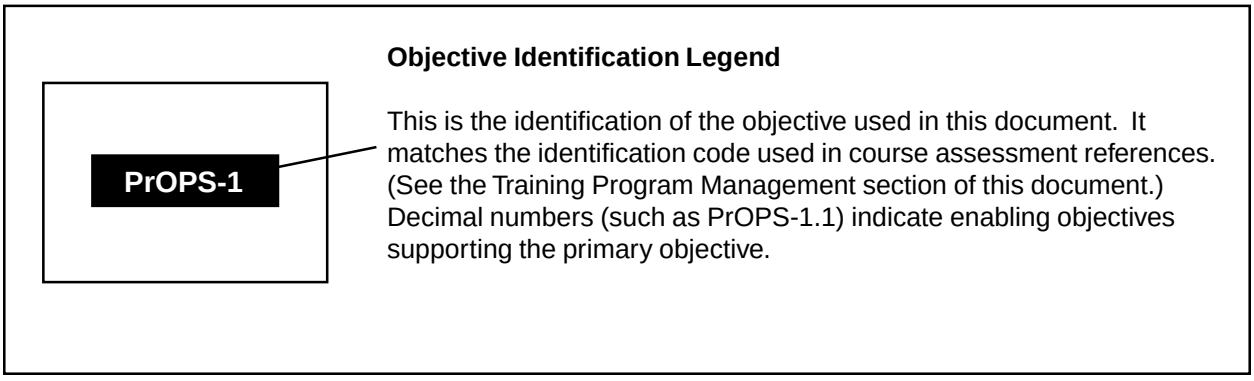
The scope and duration of training will vary depending on the nature and complexity of related SOGs and safety systems. Checklists, job aids, and other practical tools that can be used at the work site should be included in course materials whenever possible.

Recommended Training

Prevention in Operations

Two types of statements are used to describe training requirements recommended for Prevention in Operations. Terminal objectives identify broad job competencies. Enabling objectives describe instructional competencies that lead to proficiency in the terminal objective. Together, these statements identify generic training needs for all audience members. Hazardous materials training managers are encouraged to refine this material as necessary to clarify the training requirements of different audience groups.

The training objectives presented in the next section are consistent with federal requirements and national standards. Included are FEMA and NRT planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA requirements, and guidance disseminated by the chemical industry.



Identification	***Recommended** Training Objectives*
PrOPS-1	Given an overview of prevention concepts and activities (see *Prevention Awareness)*, describe employee safety requirements.
PrOPS-1.1	Describe general safety and health provisions protecting worker safety.
PrOPS-1.2	Describe general guidelines for employee participation in hazardous materials prevention activities.
PrOPS-1.3	Describe general guidelines for employee training in workplace safety and health.
PrOPS-1.4	Describe general guidelines for maintaining and accessing process safety information.
PrOPS-2	Given the organization's hazardous materials prevention program, describe elements of the program that affect operations.
PrOPS-2.1	Describe the organization's hazardous materials prevention mission and policies.

PrOPS-2.2	Describe the organization's hazardous materials emergency response capabilities and systems.
PrOPS-2.3	Describe components and relevant aspects (policies, activities, roles, etc.) of the organization's hazardous materials prevention program.
PrOPS-3	Given an operation's hazards assessment and safety plan, describe prevention strategies.
PrOPS-3.1	Identify specific hazards and risks associated with the operation.
PrOPS-3.2	Describe and demonstrate the ability to access and use process safety information to enhance prevention.
PrOPS-3.3	Describe organizational strategies and safe work practices designed to address all identified hazards.
PrOPS-4	Given an operation's work situation and scenarios, describe and apply standard operating guidelines (SOGs) that relate to safe working practices.
PrOPS-4.1	Describe the role of SOGs in hazardous materials safety and prevention programs.
PrOPS-4.2	Demonstrate the ability to apply SOGs that define safe operations (e.g., routine and non-routine operating procedures and practices, contractor safety).
PrOPS-4.3	Demonstrate the ability to apply SOGs for safety systems (e.g., pre-startup safety reviews, maintenance/mechanical integrity, management of change).
PrOPS-4.4	Demonstrate the ability to apply SOGs for compliance and enforcement activities (e.g., safety inspections and enforcement, compliance safety audits, incident record keeping, reporting, and investigations).
PrOPS-5	Given the organization's hazardous materials prevention program, participate as assigned in various program activities.
PrOPS-5.1	Demonstrate the ability to participate as assigned in prevention program analysis and planning activities.
PrOPS-5.2	Demonstrate the ability to participate as assigned in prevention training activities.
PrOPS-5.3	Demonstrate the ability to participate as assigned in the design of new or modified facilities, systems, or processes.
PrOPS-5.4	Demonstrate the ability to participate as assigned in monitoring, evaluating, and continually refining prevention program activities.

Hazardous Materials

Prevention Training Guidelines

Design and Plans Review

General Training Considerations

Introduction

Design and Plans Review describes the training requirements of persons who oversee and participate in the design, planning, approval, or construction of operations that produce, use, store, or transport hazardous materials. Audience members are responsible for incorporating the requirements and recommended practices contained in applicable prevention codes and standards into detailed blueprints, drawings, plans, specifications, instructions, and other documents. In this role, they conduct and/or supervise staff, consultants, and subcontractors in the following types of activities:

- Clarifying the technical and prevention requirements of design projects, including associated hazardous materials risks.
- Conducting a search and analysis of applicable regulations, codes, and standards to identify prevention requirements, opportunities, and recommended practices.
- Briefing and/or training design staff, construction managers, vendor representatives, consultants, and others on prevention opportunities and initiatives.
- Preparing and reviewing design plans, specifications, and support documents that incorporate and clarify prevention requirements.
- Consulting and coordinating with community and facility representatives to enhance the hazardous materials operations plans review process.
- Monitoring procurement and construction to ensure that hazardous materials operations plan requirements are met and related problems are resolved.
- Identifying hazardous materials prevention requirements for management systems and standard operating procedures for planned operations.
- Advising prevention managers, operators, and others on ways to implement, evaluate, and maintain the new facilities, systems, and processes.

Training Audience

The training audience for Design and Plans Review is composed of persons in governmental, private, industry, or non-profit organizations that develop or review the technical content of hazardous materials design plans and operational specifications. This category includes members of the facility design team and community officials who oversee the process—design project managers, prevention program managers, production managers, construction managers, community plans reviewers, zoning and planning board members, architects, engineers (mechanical, structural, chemical, electrical, civil, etc.), draftsmen, safety experts, consultants, subcontractors, and other technical specialists.

A secondary audience includes persons that implement the approved design. This group will benefit by more limited training that focuses on the specific design project and is intended to heighten awareness of related prevention concepts and techniques. Included in this category are facility procurement personnel, construction contractors, vendor representatives, community and facility inspectors, codes enforcement officials, and production operators.

Training Requirement

As a prerequisite of training, audience members are assumed to already possess the basic knowledge and skills they need to carry out their primary job responsibilities (architecture, engineering, plans review, prevention program management, etc.). Thus, the goal of training is to promote safety in hazardous materials operations by enhancing the participant's ability and motivation to 1) identify opportunities to reduce accidents and recommended practices in proposed designs, and 2) ensure that requirements for hazardous materials incident prevention are incorporated in design plans and specifications.

General Training Considerations

Training should stress the importance of the design and plans review function in prevention, and provide students with a solid grounding in related codes and standards. Instruction should also give students advanced knowledge and skills in the following areas:

- Identifying, interpreting, and applying specific prevention code items, concepts, and techniques to varying design requirements and problems.
- Assessing hazardous materials risks and prevention opportunities associated with alternative design strategies.
- Preparing and/or evaluating design plans and other documents that contribute to hazardous materials prevention.
- Providing guidance and direction to community and facility representatives to encourage the safe and effective implementation of hazardous materials operational designs.

Training Methodology Recommendations

Design and Plans Review is a highly technical and complex process involving a wide variety of possible design requirements, parameters, and variables. Training managers and course developers are encouraged to limit the scope of training to the extent possible by grouping students according to the prevention requirements of their jobs and then focusing training accordingly. All students will benefit by some basic training in hazardous materials codes, standards, and design principles. More advanced training can then be classified into five categories:

1) General—the ability to apply the broad range of hazardous materials authorities and codes to any facility or operations design.

2) Project-specific—the ability to identify and apply only those prevention requirements that are relevant to a specific facility or operations design.

3) Operations-specific—the ability to apply the broad range of hazardous materials authorities and codes to a certain type of facility or operations design (e.g., refineries, retail outlets).

4) Code-specific—the ability to apply a specific prevention code (fire, building, health, etc.) to any facility or operations design.

5) Operations and code-specific—the ability to apply a specific prevention code to a certain type of facility or operations design.

The amount of time planned for instruction will depend on the needs of the audience and the scope of training. Participants will greatly benefit by opportunities to practice and apply skills acquired during training. For example, activities can be designed to permit students, organized in teams, to research and apply prevention codes to realistic design scenarios. Actual design problems from the participants' communities and organizations is preferable for this purpose. Training should also address management and political considerations in project planning.

Other training methodology recommendations and considerations include the following:

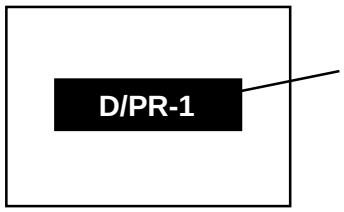
- Instructors need significant experience and technical expertise in design, plans review, prevention techniques, and state and local prevention authorities.
- Participant activities should emphasize the development of practical work products and methods to transfer learning back to the job, including checklists, job aids, and other design and planning tools.
- If possible, training should encourage interagency cooperation and information sharing among public and private sector participants.

Recommended Training

Design and Plans Review

Two types of statements are used to describe training requirements recommended for Design and Plans Review. Terminal objectives identify broad job competencies. Enabling objectives describe instructional competencies that lead to proficiency in the terminal objective. Together, these statements identify generic training needs for all audience members. Hazardous materials training managers are encouraged to refine this material as necessary to clarify the training requirements of different audience groups.

The training objectives presented in the next section are consistent with federal requirements and national standards. Included are FEMA and NRT planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA requirements, and guidance disseminated by the chemical industry.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as D/PR-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
D/PR-1	Given an overview of prevention concepts and activities (see *Prevention Awareness*), describe community and organizational prevention systems for design and plans review.
D/PR-1.1	Describe the purpose, structure, and content of state and authorities and codes that govern hazardous materials design and plans review, including those addressing: • Buildings, construction, and fire prevention • Community planning, zoning, and occupancy • Employee safety and accident prevention • Health and environmental concerns
D/PR-1.2	Describe organizational prevention policies, strategies, and systems for hazardous materials design and construction.
D/PR-1.3	Describe community and organizational prevention policies, strategies, and systems for hazardous materials plans review and approval.
D/PR-2	Given a range of representative design scenarios, design and/or evaluate plans for proposed projects to ensure that prevention requirements are met.
D/PR-2.1	Demonstrate the ability to research and analyze state and local authorities that govern hazardous materials design.

D/PR-2.2	Describe information sources on state of the art prevention technologies and recommended practices in hazardous materials design.
D/PR-2.3	Assess strategies for briefing and educating design staff members, including ways to: • Identify the knowledge requirements of design staff members. • Train staff on standard and non-standard code items. • Maintain current knowledge of prevention codes.
D/PR-2.4	Demonstrate the ability to identify and assess hazards associated with alternative design strategies.
D/PR-2.5	Demonstrate the ability to identify design strategies that optimize safety and prevention opportunities.
D/PR-2.6	Demonstrate the ability to prepare and/or evaluate design plans, specifications, and supporting documents that incorporate and clarify prevention requirements.
D/PR-2.7	Assess strategies for coordinating activities among facility, community, and design team representatives to enhance prevention.
D/PR-3	Given an approved design, assist in promoting prevention through the effective implementation and maintenance of the project.
D/PR-3.1	Assess strategies for preparing contractor and vendor documents that incorporate and clarify the prevention requirements of the design plan.
D/PR-3.2	Assess strategies for assisting construction personnel and vendor representatives to interpret the project's prevention requirements.
D/PR-3.3	Assess strategies for monitoring procurement and construction activities to ensure that prevention requirements are met.
D/PR-3.4	Assess strategies for assisting prevention program managers and operators to develop and implement safe operational systems and employee work procedures.
D/PR-3.5	Assess strategies for assisting prevention program managers and operators to safely activate, integrate, evaluate, and maintain the new facility, system, or process.

Hazardous Materials

Prevention Training Guidelines

Inspection and Enforcement

General Training Considerations

Introduction

Inspection and Enforcement describes the training needs of persons who monitor, inspect, and enforce safety compliance in operations that produce, use, store, or transport hazardous materials. In this role, audience members 1) identify hazardous materials risks and prevention opportunities associated with specific facility and transportation operations, and 2) assess and enforce compliance with established prevention authorities and codes.

The specific job requirements of Inspection and Enforcement personnel will vary depending on the size and nature of operations involved, the prevention strategy of the organization, assigned responsibilities, etc. However, a generic list of job responsibilities would include the following:

- Assess the adequacy of hazardous material prevention plans and programs prepared by facilities and transport companies.
- Assess the adequacy of safety systems and response capabilities in facilities and transport companies.
- Ensure that equipment is properly installed and maintained.
- Ensure that operating procedures are safe and effectively implemented.
- Ensure that operations and maintenance personnel are adequately trained.
- Brief community and facility officials of safety deficiencies and opportunities, and promote cooperation and coordination among decision makers.
- Monitor efforts to resolve problems, and implement policies and procedures designed to enforce compliance with applicable authorities and codes.
- Participate in safety reviews, compliance audits, incident investigations, and other types of prevention activities.

Training Audience

The training audience for Inspection and Enforcement includes inspectors and officials from community agencies (e.g., fire service, police, health agency, etc.) that are responsible for prevention, enforcement, and compliance programs and activities in the jurisdiction. Included are representatives of agencies that develop and enforce codes in all related areas: buildings, transportation, employee safety, fire, health, and so on.

The training audience also includes inspectors and enforcement personnel from public, private, and non-profit facilities that store, handle, transport, or use hazardous materials. In business and industry, the role may be filled by prevention program managers, safety officers, production managers, shift supervisors, or others assigned the responsibility. Representatives of insurance companies, consultants, safety experts, and others also perform the function in certain situations.

Training Requirement

As a prerequisite of training, students are assumed to already possess basic knowledge and skills in inspection and enforcement. Therefore, the primary goal of training is to promote hazardous materials prevention and safety by enhancing the participant's ability and motivation to 1) identify safety deficiencies and opportunities associated with the hazardous materials operations, 2) assess compliance with applicable prevention authorities and codes, and 3) monitor and enforce compliance according to established policies and protocols.

General Training Considerations

Inspection and Enforcement is a technical and complex process, potentially involving the application of a broad range of prevention authorities and codes to many different types of hazardous materials operations. All students will benefit by basic training in hazardous materials prevention and related authorities and codes. Training managers and course developers are encouraged to limit the scope of more advanced instruction to the extent possible by grouping students according to their job requirements and then focusing training accordingly. More advanced technical training can be classified into five categories:

1) General—the ability to apply the broad range of hazardous materials authorities and codes to any facility/process or operations.

2) Project-specific—the ability to identify and apply only those prevention requirements that are relevant to a specific facility/process or operations.

3) Operations-specific—the ability to apply the broad range of hazardous materials authorities and codes to a certain type of facility/process or operations (e.g., refineries, retail outlets).

4) Code-specific—the ability to apply a specific prevention code (fire, building, health, etc.) to any facility/process or operations.

5) Process- and code-specific—the ability to apply a specific prevention code to a certain type of facility/process or operations.

However training is targeted, participants will benefit by generic instruction in hazardous materials prevention and an understanding of the organization's prevention, inspection, and enforcement programs. Course content should then emphasize the knowledge and skills students need to apply established authorities, systems, and procedures in representative hazardous materials and transport operations.

Training Methodology Recommendations

As described above, training requirements for different audience members may vary significantly. Therefore, students should be grouped whenever possible by job categories that reflect their inspection and enforcement responsibilities. Training can then be more effectively tailored to the specialized needs of different employees.

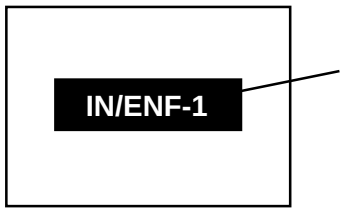
Instructional methodologies should emphasize opportunities for students to interpret and practice applying prevention codes and program requirements to different types of operations and under different types of conditions. Participant activities should also address management and political considerations. Examples and realistic scenarios are appropriate for this purpose. Practice should highlight creative approaches and practical solutions to common problems.

The scope and duration of training will vary, depending on the nature and complexity of organizational inspection and enforcement procedures, hazardous materials operations, and related authorities and codes. Checklists, job aids, and other practical tools that can be used on site should be included in course materials whenever possible.

Recommended Training
Inspection and Enforcement

Two types of statements are used to describe training requirements recommended for Inspection and Enforcement. Terminal objectives identify broad job competencies. Enabling objectives describe instructional competencies that lead to proficiency in the terminal objective. Together, these statements identify generic training needs for all audience members. Hazardous materials training managers are encouraged to refine this material as necessary to clarify the training requirements of different audience groups.

The training objectives presented in the next section are consistent with federal requirements and national standards. Included are FEMA and NRT planning guidelines for communities and facilities, DOT Transportation Regulations, various OSHA worker safety guidelines, EPA requirements, and guidance disseminated by the chemical industry.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as IN/ENF-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
IN/ENF-1	Given an overview of prevention concepts and activities (see *Prevention Awareness*), describe aspects of the hazardous materials prevention system.
IN/ENF-1.1	Describe state and local laws, regulations, and policies that govern hazardous materials inspections and enforcement.
IN/ENF-1.2	Describe prevention strategies, activities, and roles specified in emergency operations and prevention plans.
IN/ENF-1.3	Describe strategies and plans for conducting hazardous materials inspections and enforcement activities.
IN/ENF-1.4	Describe administrative systems and roles for conducting hazardous materials inspections and enforcement activities.
IN/ENF-2	Given key prevention authorities and a range of representative inspection scenarios, identify hazardous materials safety deficiencies and opportunities.

IN/ENF-2.1 Describe the purpose, structure, and content of key federal authorities governing the production, storage, handling, and transport of hazardous materials, including:

- OSHA's General Safety and Health Provisions (29 CFR 1926.20)
- OSHA's Process Safety Management Standard (29 CFR 1910.119)
- EPA's Accidental Release Prevention Requirements (40 CFR Part 68)
- OSHA's Hazard Communication Standard (29 CFR 1910.1200)
- DOT's Hazardous Materials Regulations (49 CFR)
- NRT's Integrated Contingency Plan Guidance

IN/ENF-2.2 Describe the purpose, structure, and content of state and local hazardous materials prevention ordinances, codes, and standards addressing:

- Buildings, construction, and fire prevention
- Community planning, zoning, and occupancy
- Employee safety and accident prevention
- Health and environmental concerns

IN/ENF-2.3 Demonstrate the ability to 1) research and apply prevention authorities and codes to representative hazardous materials operations and situations, and 2) identify related safety deficiencies and opportunities.

IN/ENF-3 Given prevention strategies and plans, conduct hazardous materials inspections and enforcement activities as assigned.

IN/ENF-3.1 Demonstrate the ability to gather data, categorize risks, identify violations, and establish priorities among inspection requirements.

IN/ENF-3.2 Demonstrate the ability to implement hazardous materials inspection procedures, addressing such factors as:

- Forms, checklists, questionnaires, etc.
- Scheduling and planning inspections
- Briefing facility managers, operating personnel, transporters, etc.
- Gathering inspection data and identifying violations
- Identifying safety deficiencies and concerns
- Documenting and reporting results

IN/ENF-3.3 Demonstrate the ability to implement enforcement procedures (consultation, violation notices, citations, personnel actions, audits, legal actions, etc.) designed to ensure compliance with inspection results.

Appendix A: Hazardous Materials Prevention Authorities and Statutory Mandates

HAZARDOUS MATERIALS PREVENTION AUTHORITIES AND STATUTORY MANDATES

FEDERAL TRANSPORTATION AUTHORITIES

Hazardous Materials Transportation Act

The Hazardous Materials Transportation Act (Public Law 93-633 as amended) is the basic statute pertaining to the transportation of hazardous materials in the United States. The law strengthened regulatory and enforcement activities by providing the Secretary of Transportation with broad authority to set regulations for all modes of transportation. Specifically, the Act:

- Authorized DOT to issue regulations related to placarding, handling, packing, repacking, marking, routing, and labeling;
- Expanded the regulated community to include container manufacturers;
- Authorized establishment of a shipper registration program;
- Provided DOT with authority to conduct surveillance activities and assess penalties; and
- Defined the relationship between federal, state, and local government regulations.

HMTA requires the training of all hazardous materials employees in order to reduce incidents by improving safety awareness. It separated the National Transportation Safety Board from the DOT structure, making it an independent body reporting directly to Congress.

Hazardous Materials Transportation Uniform Safety Act

In 1990, Congress enacted the Hazardous Materials Transportation Uniform Safety Act (HMTUSA, Public Law 101-65 as amended). The statute required that DOT issue rules to:

- Regulate hazardous materials transport in intrastate commerce;
- Create shipping manifests;
- Regulate training for handlers of hazardous materials;
- Require certain hazardous materials carriers to hold safety permits;
- Issue procedures and waivers for preemptions;
- Develop and implement a grant program for local emergency planning and first responder training, and develop a national curriculum;
- Improve hazardous materials identification systems;
- Determine the costs and benefits of a continually monitored emergency response telephone system; and
- Require certain shipper and carrier registration fees.

HMTUSA also required DOT and other organizations to conduct certain studies related to hazardous materials transportation. The law amended HMTA to require the Secretary of Transportation to participate in international forums that establish or recommend mandatory standards and requirements for the transportation of hazardous materials in international commerce.

Hazardous Materials Regulations

To ensure public safety and minimize risks posed by hazardous materials in transportation, Congress requires the Secretary of Transportation to prescribe regulations for safe transportation of hazardous materials. The *Hazardous Materials Regulations* (49 CFR Parts 171-180) govern the classification, shipper and carrier operations, hazard communication requirements, and packaging and container specifi-

cations for the various modes of transportation (air, water, rail, and highway). Related training and incident reporting requirements are also defined. In addition, the regulations explain DOT policies on hazardous materials inspections and enforcement, which focus on compliance with classification, description, marking, labeling, and packaging requirements.

The Hazardous Materials Regulations consist of the following Parts:

- Part 171: General Information, Regulations and Definitions
- Part 172: Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
- Part 173: Shippers—General Requirements for Shipment and Packagings
- Part 174: Carriage By Rail
- Part 175: Carriage By Aircraft
- Part 176: Carriage By Vessel
- Part 177: Carriage By Public Highway
- Part 178: Specifications For Packagings
- Part 179: Specifications For Tank Cars
- Part 180: Continuing Qualifications and Maintenance of Packagings

FEDERAL WORKER PROTECTION AUTHORITIES

Occupational Safety and Health Act of 1970

The *Occupational Safety and Health Act of 1970* (Public Law 91-596, as amended) was designed to assure safe and healthful employment conditions for all workers in the United States. The Act mandates that each employer provide a place of employment that is free from recognizable hazards which may cause death or physical harm. It establishes authority and procedures for the development, promulgation, and enforcement of occupational safety and health standards, including those dealing with toxic materials and harmful physical agents.

Among other purposes, the Act establishes conditions for:

- Encouraging employers and employees in their efforts to reduce occupational safety and health hazards, and to develop and refine related safety programs.

- Authorizing the Secretary of Labor to set mandatory occupational safety and health standards and guidelines for businesses.

- Establishing procedures for inspections, investigations, and enforcement of the standards, including variations, citations, penalties, etc.

- Providing for research in the field of occupational safety and health, and for the development of innovative methods, techniques, and approaches to reduce injuries and exposures on the job.

- Providing grants to encourage states to assume the fullest responsibility for the administration and enforcement of their occupational safety and health laws.

- Establishing medical criteria and reporting procedures to help achieve the objectives of the Act.

Standards promulgated under the Act are intended to address “the use of labels or other appropriate forms of warning as are necessary to insure that employees are apprised of all hazards to which they are exposed, relevant symptoms and appropriate emergency treatment, and proper conditions and precautions of safe use or exposure.” Where appropriate, standards should also prescribe suitable protective equipment, controls or technological procedures, methods for monitoring and measuring employee exposure, and the type and frequency of medical examinations or other tests for persons who may become exposed to hazards.

Process Safety Management

OSHA's *Process Safety Management of Highly Hazardous Chemicals* standard (29 CFR 1910.119) contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, fire, or explosion hazards. Its major objective is to prevent unwanted releases of hazardous chemicals especially into locations which could expose employees and others to serious hazards. The standard covers processes involving listed (highly hazardous) chemicals at specified quantities and flammable liquids or gases in quantities of 10,000 pounds or more (except products used solely for heating or fuel).

The Process Safety Management Standard addresses requirements and nonmandatory guidelines in the following areas, each of which is explained in more detail in Appendix D:

- Employee involvement
- Process safety information
- Process hazard analysis
- Operating procedures and practices
- Employee training
- Contractors
- Pre-startup safety reviews
- Mechanical integrity
- Nonroutine work authorizations
- Managing change
- Investigation of incidents
- Emergency Preparedness
- Compliance audits

Hazard Communication

OSHA's *Hazard Communication Standard* (29 CFR 1910.1200/1926.59) is designed to ensure that the hazards of all chemicals used in the workplace are properly evaluated, and that the resulting information is transmitted to employers and employees. This knowledge will help employers provide safer workplaces, and help employees protect themselves. The result should be a reduction in chemical source illnesses and injuries.

The standard's design is simple. Chemical manufacturers and importers must evaluate the hazards of the chemicals they produce or import. Using that information, they must then prepare labels for containers and material safety data sheets (MSDSs). Manufacturers, importers, and distributors of hazardous chemicals are then required to provide these labels and MSDSs to their customers. Employers that "use" the chemicals must obtain the information and provide it to their own employees through the following activities:

- Identify and list hazardous chemicals in the workplace.
- Obtain MSDSs and labels for each hazardous chemical.
- Develop and implement a written hazard communication program, including labels, MSDSs, and employee training.
- Communicate hazard information and appropriate protective measures to their employees through labels, MSDSs, and formal training programs.

Safety and Health Program Management Guidelines

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their costs. To assist employers and employees in developing effective safety and health programs, OSHA published recommended *Safety and Health*

Program Management Guidelines (Federal Register 54(18):3908-3916, January 26, 1989). These voluntary guidelines apply to all places of employment covered by OSHA. The guidelines recommend specific actions under each of four general elements that are critical to the development of a successful safety and health management program:

- Management commitment and employee involvement
- Worksite analysis
- Hazard prevention and control
- Safety and health training

FEDERAL ENVIRONMENTAL SAFETY AUTHORITIES

During the last three decades, general public awareness and concern resulting from major accidents have contributed to the enactment of new laws that establish current federal environmental policy. Hazardous materials prevention policy has been included in and derived from the statutory language of this legislation. Recent laws include:

- Water Quality Improvement Act of 1970
- 1972 Amendments to the Federal Water Pollution Control Act (Clean Water Act)
- Safe Drinking Water Act of 1974
- Toxic Substances Control Act of 1976
- Resource Conservation and Recovery Act of 1976
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980
- Emergency Planning and Community Right-to-Know Act of 1986
- Oil Pollution Act of 1990

Of particular importance in this framework of federal environmental safety and hazardous materials prevention authorities are the Clean Air Act Amendments of 1990 and EPA's Accidental Release Prevention standard.

Clean Air Act Amendments

Section 112(r)(7) of the Clean Air Act Amendments of 1990 (CAAA; Public Law 101-549) mandated that EPA promulgate regulations and develop guidance to prevent and mitigate the consequences of accidental releases to the air of chemicals that pose a significant risk to the public and the environment. The law specified that the regulations cover "the use, operation, repair, replacement, and maintenance of equipment to monitor, detect, inspect, and control such releases, including training of persons in the use and maintenance of such equipment and in the conduct of periodic inspections." In addition to operations, regulations should also address emergency response, storage, recordkeeping, reporting, vapor recovery, and other requirements.

The law requires the owner or operator of a stationary source at which a regulated substance is present in specified quantities to prepare and implement a risk management plan to detect and prevent or minimize accidental releases. The plan must include a hazard assessment of any regulated substance, including an estimate of potential release quantities, possible population exposures, release histories, and an evaluation of worst-case incidents. The law also specifies that EPA describe requirements for employers to develop and implement safety and response programs.

Section 304 of the CAAA required OSHA to promulgate "a chemical process safety standard designed to protect employees from hazards associated with accidental release of highly hazardous chemicals in the workplace" and a "list of highly hazardous chemicals which includes toxic, flammable, highly reactive, and explosive substances." Congress stressed that the standard should be developed in coordination with EPA, and address, at a minimum, employer requirements for safety information systems, workplace hazard assessments, employee participation, employee information and training, operating procedures, quality assurance programs, maintenance programs, pre-startup safety reviews, management of change, and incident investigations.

Accidental Release Prevention

The Clean Air Act Amendments of 1990 mandated that EPA promulgate regulations and develop guidance to prevent accidental releases to the air of regulated substances and mitigate the consequences of releases that do occur. The resulting rule, *Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)(7)* (40 CFR Part 68) focuses prevention measures on chemicals that pose the greatest risk to the public and the environment. Chemical processes are divided into three categories based on the potential for off-site consequences associated with a worst-case accidental release, accident history, and compliance with the requirements of OSHA's Process Safety Management Standard.

In summary, the owner or operator of a covered process must (1) prepare and submit a risk management plan (RMP), including registration that covers all affected processes and chemicals; (2) conduct a worst-case release scenario analysis, review accident history, and ensure emergency response procedures are coordinated with community response organizations to determine eligibility for Program 1; (3) if eligible, document the worst case and complete a Program 1 certification for the RMP; (4) for Program 2 processes, conduct a hazard assessment, document a management system, implement a more extensive but still streamlined prevention program, and implement an emergency response program; and (5) for Program 3 processes, conduct a hazard assessment, document a management system, implement a prevention program that is fundamentally identical to the OSHA Process Safety Management Standard, and implement an emergency response program.

NATIONAL CODES AND STANDARDS

Uniform Fire Code Article 80—Hazardous Materials

Article 80 of the Uniform Fire Code defines requirements for the "prevention, control, and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials and information needed by emergency response personnel" (80001.1.1). The code applies to all hazardous materials (as defined in Article 2) except when specific requirements are provided in other articles.

General requirements addressed in Article 80 include permits; development of hazardous materials management plans and inventory statements; design, construction, and installation of equipment; handling and transport of hazardous materials; safety information (MSDS forms, identification signs, etc.); and general safety precautions. Storage requirements are then defined in detail for the various hazard categories (compressed gases, flammable solids and gases, organic peroxides, etc.). Finally, section 8004 describes requirements for use, dispensing, and handling of hazardous materials, both for indoor and outdoor applications.

NFPA 1—Fire Prevention Code

The Fire Prevention Code developed by the National Fire Protection Association (NFPA) "prescribe(s) minimum requirements necessary to establish a reasonable level of fire safety and property protection from the hazards created by fire and explosion. The scope covers the construction, maintenance, and use of property to the extent that such is not covered by existing NFPA codes and standards." The document is intended to provide jurisdictions with a guideline for the development of a local fire prevention code.

Parts I-IV of NFPA 1 describe general fire prevention requirements, which serve to reduce the risk of fire as a cause of or contributing factor in hazardous materials accidents. Areas addressed include the administration and enforcement of fire prevention programs (recordkeeping and reporting, owner/occupant responsibilities, permits and approvals, etc.); general fire safety requirements (construction, systems and equipment, automatic sprinklering, alarm systems, etc.); and occupancy fire safety requirements (day-care facilities, health care centers, hotels, etc.).

Part V—Special Processes and Material Handling—describes specific hazardous materials requirements, which have been organized by hazard category or application type. The following sections are of particular importance for hazardous materials prevention:

- Chapter 27—Hazardous Materials and Chemicals
- Chapter 28—Flammable and Combustible Liquids
- Chapter 30—Liquefied Petroleum Gases/Liquefied Natural Gases
- Chapter 33—Spray Application Using Flammable and Combustible Materials
- Chapter 35—Dust Explosion Prevention
- Chapter 39—Combustible Fibers

BUILDING CODES

Most jurisdictions base their building codes on “model” codes developed by the Building Officials and Code Administrators (BOCA), the Southern Building Code Congress International (SBCCI), or the International Conference of Building Officials (ICBO). For example, the BOCA National Building, Property Maintenance, and Fire Prevention Codes address safety issues and standards in the construction and operation of buildings, including the administration, organization, and enforcement of related regulations by state and local government units. The three organizations have formed a joint effort, the International Codes Council (ICC), and are working to develop a single International Code that will eventually replace the separate codes.

Hazardous Materials

Prevention Training Guidelines

Appendix B: Hazardous Materials Prevention Training Requirements

OSHA Training Requirements

Many standards promulgated by OSHA explicitly require employers to train employees in the safety and health aspects of their jobs. Other OSHA standards make it the employer's responsibility to limit certain job assignments to employees who are "certified," "competent," or "qualified," meaning that they have had special training in or out of the workplace. These requirements reflect OSHA's belief that training is an essential part of every employer's safety and health program for protecting workers from injuries and illnesses.

General industry training requirements related to hazardous materials prevention are contained throughout 29 CFR Part 1910, addressing, for example, personal protective equipment, employee emergency plans, and fire protection. Other hazardous materials training requirements can be found in standards developed for specific industrial sectors, e.g., maritime (Parts 1915, 1917, 1918), construction (Part 1926), and agriculture (Part 1928).

The Hazard Communication Standard (29 CFR 1910.1200) requires employers to establish training and information programs for employees exposed to hazardous chemicals in the workplace. Training, which must be conducted at the time employees are initially assigned and whenever a new hazard is introduced, should address the following elements:

- How the hazard communication program is implemented in the workplace, and how employees can obtain and use the available hazard information.
- How to read and interpret information on labels and MSDSs.
- The hazards of all chemicals in the work area, and measures employees can take to protect themselves.
- Specific procedures put into effect by the employer to provide protection, such as engineering controls, work practices, and personal protective equipment (PPE).
- Methods and observations—such as visual appearance or smell—that workers can use to detect the presence of hazardous chemicals to which they may be exposed.

Under this rule, an employer can provide employees information and training through whatever means are found to be appropriate and protective. Employee training may be satisfied in part by general training by, for example, trade associations, unions, colleges, and professional schools. In addition, previous training, education, and experience of workers may relieve the employer of some requirements under this regulation. Regardless of the method chosen, however, the employer is always ultimately responsible for ensuring that employees are adequately trained.

OSHA's *Process Safety Management of Highly Hazardous Chemicals* standard (29 CFR 1910.119) identifies additional training requirements for employers with large-scale chemical processes as defined in the regulation. The requirements cover subjects such as an overview of the process, safety and health hazards, operating procedures and safety work practices, emergency operations including shutdown, routine and nonroutine work authorization activities, and other areas pertinent to process safety and health. Refresher training should be provided at least every three years, and more often if necessary. Employers are further required to document that each covered employee has received and understood the training required under the standard. Separate but similar training requirements are specified for contract employees.

In this standard, OSHA has adopted a performance-oriented approach to training. Employers can determine the amount of training and the content of the training program that best reflects the operation's complexity and the experience and necessary skill level of their employees. A minimum number of training hours is not specified, and previous training and experience can be recognized if the employer certifies in

writing that employees have the required knowledge, skills, and abilities to safely carry out their duties and responsibilities. (Note: essentially similar training requirements are identified in EPA's *Accidental Release Prevention Requirements: Risk Management Programs* (40 CFR Part 68) for designated facilities.)

Transportation Training Requirements

Federal transportation law requires the training of all hazardous materials employees, defined as persons who directly affect hazardous materials transportation safety. The term includes employees and self-employed individuals who:

- Load, unload, or handle hazardous materials;
- Test, recondition, repair, modify, mark, or otherwise represent packagings as qualified for use in the transportation of hazardous materials;
- Prepare hazardous materials for transportation;
- Have responsibility for the safety of transporting hazardous materials; or
- Operate a vehicle used to transport hazardous materials.

Instruction should increase the employee's awareness of safety and ability to perform assigned functions, thereby reducing the number and severity of hazardous materials incidents. Training should include a systematic program that ensures that hazardous materials employees have familiarity with the general provisions of the Hazardous Materials Regulations (49 CFR Parts 171-180), are able to recognize and identify hazardous materials, have knowledge of specific regulatory requirements applicable to their job functions, and have knowledge of emergency response information, self-protection measures, and accident prevention methods and procedures.

Each hazardous materials employer is responsible for training and testing workers, certifying that they can perform their assigned duties, and developing and retaining records of current training. Instruction must include general awareness/familiarization, function-specific, and safety training. Driver training is also required for hazardous materials employees who will operate a motor vehicle. In addition, the regulations prescribe modal-specific training requirements for the individual modes of transportation (air, vessel, highway, etc.) in 49 CFR Parts 174-177.

The regulations define requirements and exceptions for initial training and recurrent or refresher training, required at least once every three years. Relevant training received from a previous employer or source may be used to satisfy the requirements, provided a current record of training is obtained form the previous employer or source. Employers are required to develop and retain training records for the preceding three years, to include at a minimum:

- Hazmat employee's name
- Completion date of most recent training
- Training materials (copy, description, or location)
- Name and address of hazmat trainer
- Certification that the employee has been trained and tested

Environmental Safety Training Requirements

The Clean Air Act Amendments of 1990 (Public Law 101-549) authorized EPA to promulgate regulations that require the owner or operator of regulated facilities (stationary sources) to prepare a risk management plan which identifies employee training measures. At a minimum, the standard would require employers to:

- Provide written safety and operation information to employees and train employees in operating procedures, emphasizing hazards and safe practices;

- Train and educate employees and contractors in emergency response; and

- Establish maintenance systems for critical process-related equipment, including employee training to ensure ongoing mechanical integrity.

Haz Mat Prevention Training Requirements

In response to this legislative mandate, EPA promulgated the *Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)(7)* (40 CFR Part 68). This rule identified training requirements for Program 3 processes (Section 68.71) that are identical to the OSHA Process Safety Management standard, with minor wording changes to address statutory differences. The requirements address initial training, refresher training, employer certification, and training documentation for larger and more complex hazardous materials operations.

Section 68.54 of the EPA standard describes a streamlined version of OSHA training requirements for Program 2 sources, which generally have more simple processes and fewer employees involved in hazardous materials operations. The primary difference is that training documentation requirements identified for Program 3 processes have been dropped. The rule specifically states that training conducted to comply with other federal or state regulations or industry codes, or training conducted by equipment vendors, may be used to demonstrate compliance if the training covers the standard operating procedures (SOPs) for the process. Workers must be retrained when SOPs are revised as a result of a major change in operations.

The EPA Accidental Release Prevention standard does not specify safety training requirements for Program 1 processes. Program 1 is available to any process that has not had an accidental release with offsite consequences in the five years prior to the submission of the risk management plan and has no public receptors within the distance to a specified toxic or flammable endpoint associated with a worst-case release scenario.

Hazardous Materials

Prevention Training Guidelines

Appendix C: Organizational Structure for Hazardous Materials Prevention

ORGANIZATIONAL STRUCTURE FOR HAZARDOUS MATERIALS PREVENTION

[Note: The following material, which summarizes government agency programs in hazardous materials prevention, is derived from "A Review of federal Authorities for Hazardous Materials Accident Safety: Report to Congress Section 112(r)(10) Clean Air Act As Amended," prepared in coordination with the National Response Team by the Chemical Emergency Preparedness and Prevention Office of EPA. The material will be reviewed and updated during the national review of these draft Curriculum Guidelines.]

Primary responsibility for the development and implementation of accident prevention measures at the federal level is within DOT, including the U.S. Coast Guard; OSHA within the Department of Labor and EPA. The NRC also maintains regulatory responsibilities for source, by-product, and special nuclear materials. Some of the statutes and regulations administered by NRC, in conjunction with FEMA, particularly in the areas of planning and response to significant radioactive materials emergencies, are discussed in this review. Other laws and regulations pertinent to the safety of commercial nuclear power plants were not considered within the scope of this analysis. Food and Drug Administration authorities for consumer-related hazardous materials safety were not considered within the scope of this review.

DOT/Research and Special Programs Administration (RSPA)

The administering body for hazardous materials safety within DOT is the Research and Special Programs Administration. The Hazardous Materials Transportation Act (HMTA) of 1975 gave DOT umbrella authority for developing hazardous materials transportation safety policy. It enabled the Office of Hazardous Materials Safety to develop policies pertinent to all modes of transportation. HMTA authorized the Secretary to issue regulations for the safe transportation in commerce of hazardous materials. The Hazardous Materials Transportation Uniform Safety Act (HMTUSA) of 1990 expanded DOT's hazardous materials safety responsibilities and clarified certain provisions contained in the original HMTA.

RSPA Prevention and Regulatory Programs. RSPA's Office of Hazardous Materials Safety has primary responsibility for regulating the transport of hazardous materials across all modes except pipelines. Because of the multiple points of exposure during transportation and the potential for exposure to hazardous material handlers and first responders, the primary goal of these regulations is to prevent accidents from occurring. A secondary goal is to ensure that response personnel can easily identify the materials, so that the appropriate actions and precautions can be taken if an accident does occur. The regulations address: criteria for classifying risks of materials being transported; identification through proper labeling and manifesting of what is being transported; containerization and packaging for transport; handling of hazardous materials in loading and unloading; and procedures for accident notification and follow-up reports.

Federal hazardous materials regulations (except for penalties and specific relief provisions) apply to all agencies of the Federal government with the exception of the U.S. Postal Service. They also apply to all contractors used by Federal government agencies.

RSPA's Office of Pipeline Safety oversees the safe transportation of natural gas to 55 million residential and commercial customers, and the environmentally sound transportation of 25 percent of the nation's intercity freight, more than 605 billion ton miles of petroleum and other hazardous materials by pipeline. This office has jurisdiction over more than 2,000 gas pipeline operators and 155,000 miles of pipeline that transport hazardous liquids, and is authorized under the Natural Gas Pipeline Safety Act of 1968 and the Hazardous Liquid Pipeline Safety Act of 1979 (HLPSA). Following enactment of the Oil Pollution Act of 1990, the Department delegated responsibility for spill prevention and containment of oil and hazardous substances from pipelines to RSPA. These responsibilities, defined under the Federal Water Pollution Control Act, further expand the role of RSPA in environmental protection, and cover categories of pipelines currently excepted by the HLPSA or regulations adopted thereunder. Pipeline safety

regulations cover criteria for pipe design, joining of materials, construction, customer meters, service regulators and service lines, corrosion control, testing, upgrading, operations, and maintenance. Enforcement of the regulations is shared by 244 State and 24 Federal inspectors.

RSPA Enforcement. RSPA has the primary federal responsibility for enforcing hazardous materials regulations for transportation. RSPA's enforcement process includes random inspections of packaging manufacturers, shipper and carrier facilities, and investigations of accidents and incident involving hazardous materials. In addition to RSPA's enforcement program, the DOT modal administrations (Federal Highway Administration, Federal Aviation Administration, Federal Railway Administration, and U.S. Coast Guard) and the states also enforce the hazardous materials regulations.

RSPA Training. More recent initiatives, developed in response to HMTUSA, are focusing on providing grants for emergency preparedness planning to states and grants for emergency response training to states and Native American tribes. The Office of Hazardous Materials Safety is administering a planning and training grant program assisted by other federal agencies, including FEMA, EPA, DOE, OSHA, NIEHS and the Bureau of Indian Affairs. DOT also offers training through the Transportation Safety Institute and prepares and distributes training modules and other materials. In addition, the Federal Highway Administration provides funds for training to states.

DOT/U.S. Coast Guard

USCG Regulatory Programs. The Coast Guard maintains regulatory authority for bulk carriers by water transport. Because authority for transportation by navigable waters has historically been a federal responsibility, the Coast Guard exercises a unique and broad authority over the shipping industry. In general, its application of an "umbrella" regulatory structure controls vessel design, operations, pollution prevention, personnel qualification, and a number of other categories. Domestic and foreign vessels operating on the navigable waters of the United States are required to have proper licensing and documentation in order to operate, and in the case of commercial vessels, to take part in their trade. The Coast Guard is responsible for issuing these certificates and endorsing certificates issued by international organizations.

Among the provisions administered by the Coast Guard are regulations concerning:

- The boundaries for Coast Guard jurisdiction;
- Specific requirements for obtaining waivers to inspection laws and regulations;
- The transportation of hazardous materials in vessels, including the carriage of explosives, and port and waterway safety;
- The prevention of pollution from ships and the enforcement of waste reception facility requirements;
- The prevention of oil discharges into the navigable waters of the U.S.;
- The protection and security of vessels, harbors and waterfront facilities;
- Dry bulk waterfront facilities; and
- The oversight of and prevention of unlawful dumping or transportation of materials for dumping into the ocean (the EPA exercises most of the regulatory authority over this activity).

The Ports and Waterways Safety Act of 1972 provides for the establishment, operation, and maintenance of vessel traffic services, the control of vessel movement, among other matters, and the establishment of vessel operating requirements. The act allows for field level controls that, if not appropriately applied, would result in an unacceptable hazard to the environment or property. Orders regarding these matters can be issued only by the Captain on the Port or the cognizant District Commander.

The Federal Water Pollution Control Act (FWPCA), as amended, delegates to the Coast Guard the enforcement authority and responsibility in cases where oil and hazardous substances are discharged in harmful quantities. The Coast Guard is also tasked with enforcement of the Act to Prevent Pollution From Ships, which is the implementation of the international MARPOL protocol. The Coast Guard also conducts surveillance of Ocean dumping as mandated in the Marine Protection, Research, and Sanctuaries Act of 1972.

USCG Enforcement. Inspection, compliance, and enforcement are cornerstones to the Coast Guard's prevention programs. The Officer in Charge of Marine Inspections exercises considerable power in his/her port and is responsible for:

- Inspection of vessels and facilities to determine compliance with applicable laws, rules and regulations related to construction, equipment, manning, and operation;
- Shipyard inspections;
- Factory inspections of materials and equipment;
- Licensing, certification, shipment and discharge of seamen;
- Investigation of marine casualties and accidents;
- Pollution prevention;
- Investigations of violations of the law;
- Negligence, misconduct, unskillfulness, incompetence of persons holding licenses, certificates or documents issued by the Coast Guard;
- Initiations of actions seeking suspension or revocation of licenses; and
- Presentation at hearings held by Administrative Law Judges concerning these cases.

New vessels, foreign vessels, waterfront transfer and storage facilities, tankers, and a variety of other vessels are all required to be inspected by the Coast Guard. Certificates of inspection are issued and grant specific rights to each ship. Each class of vessel has unique inspection regulations based on the type of vessel it is and the specific cargo that it carries.

If any equipment is found not to be in compliance with applicable regulations, a form is issued to the master, owner, or operator which details the problems and mandates the specific circumstances that the cited deficiencies must be corrected. Any vessel may be inspected/reinspected. Certificates of inspection may be revoked if the vessel is found not to comply with the terms of the vessel's certificate of inspection. A vessel or facility may be exempted from complying with any specific regulation by the Commandant.

Investigations are conducted after a marine casualty to determine cause and to determine appropriate proceedings to be taken against those responsible. Investigating officers have the power to administer oaths, subpoena witnesses, etc. At the conclusion of an investigation, recommendations are forwarded to Coast Guard Headquarters program managers for review and further action as appropriate. In investigations where criminal liability is alleged, the case is referred to the U.S. Attorney General for prosecution.

Administrative punishments are intended to be remedial, not penal, with the goal of maintaining competence and safety in the field. Initial recommendations to revoke licenses are set forth by the investigating officer. Investigations are initiated if it appears that the holder of the license was negligent in some manner. An investigating officer can accept voluntary surrender of a license. Upon completion of a case investigation, the case is forwarded to an Administrative Law Judge, who holds hearings and adjudicates the cases.

Prior to the Federal Water Pollution Control Act of 1972, the Coast Guard did not have the kind of authority it needed to enforce against discharges. The Ports and Tanker Safety Act of 1978 expanded many equipment and operating requirements for vessels, with emphasis on tank vessels to coincide with many international initiatives, such as agreements reached by the International Maritime Organization.

Appendix C

Organizational Structure for Haz Mat Prevention

Coast Guard Organization. The Coast Guard maintains 47 Captain of the Port operations. The functions performed by the Coast Guard at each of these locations include: port security, port safety, facility inspections, personnel/merchant mariners documentation, vessel inspections and accident response and investigation.

Like other transportation modes, the Coast Guard's program is predicated upon prevention. However, unlike other transportation authorities, because of the history, mission, and unique resources of the Coast Guard, it maintains and is responsible for a total safety system including accident prevention, preparedness, and response.

Other Modal Administrations

Federal Aviation Administration (FAA). The FAA regulates air commerce, controls the use of airspace, and operates air navigation facilities and a common system of air traffic control and navigation for both civil and military air craft. The Administrator issues and enforces rules, regulations, and minimum standards relating to the manufacture, operation, and maintenance of aircraft, as well as the rating and certification of airmen and the certification of airports. The agency performs flight inspection of air navigation facilities in the U.S. and as required, abroad. It also enforces regulations under the Hazardous Materials Transportation Act applicable to shipments by air and investigates accidents involving air carrier.

Federal Highway Administration (FHWA). The FHWA seeks to coordinate highways with other modes of transportation to achieve the most effective balance of transportation systems and facilities. Under the authority of the motor carrier safety provisions, the agency exercises Federal regulatory jurisdiction over the safety performance of all commercial motor carriers engaged in interstate or foreign commerce. The FHWA has jurisdiction over the safe movement on U.S. highways of dangerous cargoes such as hazardous wastes, explosives, flammables, and other volatile materials, and deals with more than 185,000 carriers and approximately 25,000 shippers of hazardous materials.

The FHWA conducts safety reviews at carriers' facilities to determine their safety performance; all carriers must comply with Federal safety regulations specifying safe operating practices. Compliance reviews are conducted to follow up on problem areas identified during safety reviews. These reviews may lead to prosecution or other sanctions against violators of the Federal motor carrier safety regulations or the hazardous materials transportation regulations.

The FHWA works with states and local government enforcement officers to enforce regulations affecting interstate transportation. It provides grants to assist the states and local governments in enforcing those regulations and encourages slates to adopt regulations compatible with federal standards.

Federal Railroad Administration (FRA). The FRA promulgates and enforces rail safety regulations, administers railroad financial assistance programs, conducts research and development in support of improved railroad safety and national rail transportation policy, provides for the rehabilitation of Northeast Corridor rail passenger service, and consolidates government support of rail transportation activities. The FRA administers and enforces regulations resulting from the Railroad Safety Act and transportation of explosives and other hazardous materials under the Hazardous Materials Transportation Act, and the reporting and investigation of railroad accidents.

National Transportation safety Board (NTSB)

The National Transportation Safety Board is an independent agency that originated within the U.S. Department of Transportation (DOT). Congress passed an Act in 1975, giving the Board increased authority in accident investigation and severing its ties with DOT. The Board's mission is to determine the "probable cause" of transportation accidents and to formulate safety recommendations to improve transportation safety.

DOL/Occupational Safety and Health Administration (OSHA)

Authority for worker protection and hazardous materials prevention programs is housed in the Occupational Safety and Health Administration (OSHA), established within the Department of Labor in 1970. The Occupational Safety and Health Act (OSH Act) gives OSHA authority to promulgate its hazardous materials regulations. In addition, SARA and the 1990 Clean Air Act Amendments included OSHA requirements. OSHA's regulatory system is one which has developed requirements that apply to safety of all industries. OSHA promulgates regulations, inspects workplaces, enforces regulations, conducts workplace safety and health training, disseminates information, collects data, and investigates workplace accidents.

OSRA Regulatory Programs. The specific OSHA hazardous materials program includes standards for: the handling and storage of liquids that are flammable and combustible and of certain chemicals that are reactive and unstable; the design, installation, and use of storage tanks; fire protection within a facility; firefighting operations, including training and equipment; emergency preparedness and evacuation plans; permissible exposure limits for more than 600 air contaminants; employee access to medical records of their workplace exposures to toxic substances or harmful physical agents; medical services and first aid; protection of workers engaged in hazardous waste operations; respiratory protection; use of personal protective equipment; communication of information about hazardous chemicals, including the important requirement that employers train workers in the precautions needed to minimize the risk of potentially dangerous exposures; and, the control of hazardous energy sources, also known as lockout/tagout. OSHA recently issued its chemical process safety standard requiring employers to conduct hazard assessments of chemicals and chemical processes and to develop programs to manage these risks including the training of workers. For hazards not addressed by a particular standard, OSHA enforces the "General Duty Clause" of the OSH Act, which requires employers to provide a place of employment free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees.

OSHA Organization, Accident Investigation and Enforcement. The OSH Act encourages States to develop and operate, under Federal OSHA guidance, State job safety and health plans, including plans for hazardous materials. Once a State plan is approved, OSHA funds up to 50 percent of the program's operating costs, and the State's programs must be at least as effective as the Federal OSHA program. Twenty-five States (including two territories) have OSHA-approved programs. Twenty-three state plans cover both private and public sector employees. Two state plans cover public sector only.

OSHA investigates all serious workplace accidents involving chemical releases to determine whether there has been a violation of the OSH Act or of any regulations under that Act; and to determine whether changes are needed in the OSHA program.

Under the OSH Act, OSHA is authorized to conduct workplace inspections. OSHA inspections, in order of priority, include: imminent danger situations; to catastrophes and fatal accidents; employee complaints of violations of standards; and planned inspections of high of high-hazard or targeted industries, including the chemical industry. OSHA is also authorized to issue citations for violations of OSHA regulations and to assess penalties. In 1990 and 1991, OSHA issued unprecedented multimillion dollar penalties against several chemical companies which had willfully violated OSHA regulations. Section 4(b)(1) of the OSH Act is specifically designed to avoid duplication and overlap of federal safety and health regulations. Under section 4(b)(1), OSHA is preempted from applying its regulations to working conditions addressed by other federal agency regulations.

OSHA has placed increased emphasis on chemical accident prevention in the last two to three years. In 1990, OSHA initiated its Special Emphasis Program in the petrochemical industry (PetroSEP), by selecting 28 corporations for inspection. This program targeted corporations of more than 2,500 employers where most petrochemical facilities exist, within the three primary SIC Codes ¾ 2821 (plastic materials), 2869 (industrial organic chemicals), and 2911 (petroleum refineries). In addition, OSHA has increased its coordination with other federal agencies, in particular, with EPA, which led to a Memorandum of Under-

standing governing coordination, sharing information and data, and cooperating in certain enforcement actions in the PetroSEP program. OSHA has supported public and worker training programs at its training facility in Illinois, and has provided materials to the public.

OSHA Training. Although the Occupational Safety and Health Act of 1970 does not address specifically the responsibility of employers to provide safety and health training to employees, Section 5(a)(2) does require that each employer "...shall comply with the ...standards promulgated under this Act." OSHA standards that contain training requirements for emergency prevention, preparedness, and response cooperations include the Process Safety Management Standard, mentioned above, the Hazardous Waste Operations and Emergency Response Standard (HAZWOPER), and the Hazard Communication Standard.

Under the Hazard Communication Standard, employers must establish a training and information program for employees exposed to hazardous chemicals in their work area at the time of initial assignment and whenever a new hazard is introduced. OSHA's HAZWOPER standard covers workers employed in clean-up operations at uncontrolled hazardous waste sites and at waste treatment, storage and disposal facilities licensed by EPA under the Resource Conservation and Recovery Act (RCRA). The standard also covers workers responding to emergencies, including those involving hazardous materials (e.g., spills). State, county and municipal workers such as police, ambulance workers, and firefighters with local fire departments, are covered by the regulations issued by the 23 states that have their own safety and health programs. EPA regulations cover such employees in the other states.

EPA Hazardous Materials Organization

EPA Organization. A number of different federal environmental statutes establish the regulatory framework for hazardous materials safety for communities and the environment. Safety programs and standards, which address prevention, have been included within statutory language that is often intended to address general environmental degradation, rather than accidents in particular. EPA authority for contingency planning and emergency response is primarily from specific language and statutes, e.g., CERCLA, EPCRA, and OPA, which also contain other provisions for long-term problems.

The organization of safety programs at EPA is complex. This is due, in part, to the Agency's current structure, which organizes programs by environmental medium, typically by statute, and in part to the fragmentation of safety provisions in multiple laws. The fragmentation occurs when organizational structures are designed to accommodate statutes while sometimes de-emphasizing management of programs by function.

EPA administers hazardous materials safety provisions primarily through two offices within its Office of Solid Waste and Emergency Response. These two offices are: the Chemical Emergency Preparedness and Prevention Office (CEPPO), and the Office of Emergency and Remedial Response (OERR). Each office manages programs under multiple statutes. CEPPO is primarily responsible for regulations and programs under the 1986 Emergency Planning and Community Right to Know Act (EPCRA), for accident prevention provisions under §112(r) of the Clean Air Act, for EPA's responsibilities under HMTUSA, and for overall emergency coordination within EPA, including acting as chair of the National Response Team (NRT) and National Incident Coordination Team (NICT), the EPA intra-agency emergency coordination mechanism. OERR is responsible for regulatory and response functions required by CERCLA and SARA, and for EPA response to oil spill incidents under the Oil Pollution Act. Specific OERR responsibilities include: reviewing and approving facility Response Plans as required by the Oil Pollution Act (OPA), developing and writing revisions to the National Contingency Plan; developing prevention activities for fixed oil facilities under the Clean Water Act as amended by OPA; development of reportable quantities regulations; training for state and local first responders; developing and maintaining the Emergency Response Notification System; and response to oil spills and other emergencies in the inland zone. OERR also administers remedial programs under CERCLA.

In addition to its regulatory functions, CEPPO undertakes compliance and guidance programs under various statutory authorities. These programs are designed to support state and local planners and to

encourage industry, states and local communities in improving accident prevention, preparedness, and response efforts. Among these efforts are its Accidental Release Information Program; the Chemical Safety Audit Program under CERCLA authorities, which assists industry through facility visits in improving safety practices, technologies and techniques; and CAMEO, the EPA/NOAA computer software designed to aid in emergency planning and response at the state and local levels.

Two other offices within the Office of Solid Waste and Emergency Response have significant responsibility with respect to hazardous materials that affect safety. The Office of Solid Waste is responsible for developing and administering standards under RCRA. Permitting standards for hazardous waste management facilities, for instance, serve to reduce the probability of accidents. Similarly, the Office of Underground Storage Tanks develops and manages technical standards under Subtitle I of RCRA for underground storage of oil and hazardous substances. Both offices also manage corrective action programs for solid waste management units and leaking underground storage tanks.

The Office of Pesticides, Prevention and Toxic Substances manages EPA's system of registering new chemicals for commercial use under authority of the Toxic Substance Control Act (TSCA), and annually tracks emergency and non-emergency toxic releases as required by EPCRA through the Toxic Release Inventory. Through a registration system for potentially new chemical products, EPA receives some 3,000 to 4,000 premanufacturing notices annually. TSCA also requires immediate notification when accidental releases of a toxic chemical present a substantial risk of injury to health or the environment. This office is also responsible for administering programs under the Federal Insecticide, Fungicide, and Rodenticide Act with regard to pesticide safety and worker protection.

EPA's Office of Air and Radiation manages programs under the Clean Air Act and leads the EPA response to radiological accidents under the FRERP. Also, through the FRERP, OAR leads the federal response to accidents involving naturally-occurring and accelerator-produced radioactive materials and foreign sources of radiological materials. Recent examples are the 1979 crash of the USSR's nuclear powered COSMOS satellite in Canada, and the 1986 Chernobyl nuclear reactor accident in the Ukraine. Although the FRERP was not activated for these incidents, using the most recent revisions it would be for similar incidents. For smaller radiological incidents which do not require a coordinated federal response, this Office responds with the Office of Solid Waste and Emergency Response using the National Contingency Plan, as occurred in the clean-up of a radium chemical company in Bronx, NY. The Office of Air Quality Programs and Standards develops and implements technical standards under the Clean Air Act to prevent or reduce emergency and non-emergency releases of hazardous materials. Like RCRA standards, those air standards serve, by regulating industry practices, to reduce the probability that accidents will occur.

The Office of Water at EPA, the regional offices, and delegated states, using Clean Water Act authority, establish permitting requirements, and set standards to control the release of pollutants to surface water and to municipal wastewater treatment plants. This Office also contributes to response actions that affect wetlands, coastal areas, and oceans, and overseas implementation of the Safe Drinking Water Act.

As addressed in more detail in Chapter 4, numerous statutory and non-statutory lists of hazardous materials are managed by EPA programs. These lists form the way EPA requirements for accident prevention, preparedness, and response are developed and implemented. The lists, however, have multiple purposes and contain different listed materials based on varying criteria and statutory mandates. All of the Offices described manage lists. These lists do not currently serve an integrated function in terms of data management or regulatory development for accident safety. EPA is developing an electronic Registry of Lists under its Office of Policy, Planning and Evaluation to facilitate integration.

Most of EPA's prevention, preparedness, and response regulations, programs and activities require technical expertise and support for development and implementation. In addition, DOT draws on EPA expertise and information in the development of some of its regulations, particularly for hazard classification.

EPA Regional Organization and Enforcement. Within the ten EPA regional offices, implementation of hazardous materials safety provisions mentioned above is typically divided differently among offices. Regional Administrators have primary responsibility for implementing how their region will administer new regulations and programs. Typically, the regions will assign implementation authority to a media office responsible for a given statute. Because hazardous materials safety regulations have been promulgated under a variety of laws, it is increasingly awkward for EPA to administer its safety programs at the regional level, as well as at headquarters, with its current organizational structure.

EPA statutes also include clauses pertinent to adoption of its laws and/or regulations by the states. EPA statutes generally allow states' adoption and expansion of environmental statutes, provided that the federal standards are the minimum. Unlike the funding programs for the states used by OSHA, federal funding may or may not be provided to the states for implementation.

EPA Training. Training courses for first responders are offered by the Environmental Response Team and through the Regional programs. EPA participates with FEMA, OSHA, and DOT, among others on the Training Committee of the National Response Team in the review and development of courses for contingency planning and responses. Further, EPA develops courses to implement its prevention responsibilities.

Nuclear Regulatory Commission (NRC)

The Nuclear Regulatory Commission controls the handling of nuclear materials through an extensive licensing and regulatory program. This program includes several different requirements for responsible parties to immediately report releases of radionuclides.

The extent of the Commission's regulatory jurisdiction is limited to certain types of nuclear materials and to certain parties who may handle these materials. First, the Commission only licenses source, byproduct, and special nuclear material as defined by the Atomic Energy Act. The Commission does not license naturally-occurring and accelerator-produced radioactive materials, although exposure to naturally-occurring radioactive materials may be subject to Commission regulation when they are associated with sources, byproduct, or special nuclear material being used under an active license. Second, the Atomic Energy Act exempts certain activities of the Department of Energy and the Department of Defense involving source, byproduct, and special nuclear materials from Commission license requirements.

The Nuclear Regulatory Commission exercises its statutory authority by imposing a combination of design criteria, operating parameters, and license conditions at the time of construction and licensing. It assures that the license conditions are fulfilled through inspection and enforcement. The Nuclear Regulatory Commission and the states that have entered into agreement with the Nuclear Regulatory Commission to assume the regulations of certain programs license more than 20,000 users of radioactive materials.

The NRC and the Department of Transportation (DOT) share responsibility for regulating the transportation of licensed radioactive materials. The NRC regulates the design, construction, use, and maintenance of packagings for larger quantities of radioactive materials. The DOT regulates the carriers of radioactive material, and requires carriers to report to DOT any suspected radioactive contamination involving shipment of radioactive material. The NRC is also responsible for regulating the safeguarding of designated shipments to assure security of nuclear material against theft or sabotage.

Bureau of Alcohol, Tobacco, and Firearms (ATF), Department of Treasury

The Bureau of Alcohol, Tobacco, and Firearms (ATF) has the authority under 18 U.S.C. 40 "to protect commerce from interruption by reducing the hazards to persons or property arising from the misuse and unsafe or insecure storage of explosives." ATF regulates "any chemical compound mixture or device having a *common or intended* (emphasis added) purpose of functioning by explosion" by licensing manufacturers. The Bureau also prescribes by regulation the configuration, construction, and location of storage magazines. Section 846 of 18 U.S.C. authorizes the Bureau to inspect any accident or fire when

there is any reason to believe that explosive materials were involved. The Bureau maintains four teams and responds within 24 hours of an incident. ATF coordinates closely with DOT and DOD on classification of explosives, and with other appropriate agencies on storage.

Federal Emergency Management Agency (FEMA)

The Federal Emergency Management Agency (FEMA) provides extensive guidance, technical and/or financial assistance to State and local governments for emergency preparedness activities which include: planning, training, exercising, mitigation, and information sharing. Under Presidential Executive Order, FEMA has the responsibility to establish overall policies for emergency planning by Federal agencies. It may assess the plans of those agencies and may recommend to the President changes, if necessary.

FEMA is a member of the National Response Team and the Regional Response Teams, which coordinate hazardous materials emergency preparedness, response, and assistance activities among federal agencies, States, and local governments. FEMA may provide advice and assistance to the on-scene coordinator during an emergency regarding temporary or permanent relocation of citizens. FEMA administers the Emergency Broadcast System and a National Warning System which are used by governors and mayors to warn of disasters and communicate with the community in natural and technological emergencies. FEMA also administers an extensive program for emergency management training of State and local personnel through its Emergency Management Institute. Eighteen programs, currently managed under FEMA's Comprehensive Cooperative Agreement (CCA) provide funding and technical assistance to State and local governments for emergency management. Five of these programs provide for technical assistance only. FEMA also supports EPA in the implementation of activities under the Emergency Planning and Community Right to Know Act and DOT under the Hazardous Materials Transportation and Uniform Safety Amendments of 1990.

The U.S. Fire Administration within FEMA, coordinates federal activities related to fire protection in the following areas: fire policy and coordination, firefighter health and safety, fire data and analysis, and fire prevention and arson control. USFA works with federal, State and local governments, fire service organizations, and the private sector to minimize losses of life and property. The USFA may investigate major fire incidents to make recommendations concerning fire safety and prevention. The USFA also provides hazardous materials response training to firefighters.

Hazardous Materials

Prevention Training Guidelines

Appendix D: OSHA Process Safety Management Standard 1910.119

OSHA PROCESS SAFETY MANAGEMENT STANDARD 1910.119 APPENDIX C NONMANDATORY GUIDELINE

This material was developed by OSHA as a nonmandatory guideline to assist employers and employees in complying with the requirements of 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*. Examples presented in this appendix are not the only means of achieving the performance goals in the standard. This appendix neither adds nor detracts from the requirements of the standard.

1. **Introduction to Process Safety Management.**
2. **Employee Involvement in Process Safety Management.**
3. **Process Safety Information.**
4. **Process Hazard Analysis.**
5. **Operating Procedures and Practices.**
6. **Employee Training.**
7. **Contractors.**
8. **Pre-Startup Safety.**
9. **Mechanical Integrity.**
10. **Nonroutine Work Authorizations.**
11. **Managing Change.**
12. **Investigation of Incidents.**
13. **Emergency Preparedness.**
14. **Compliance Audits.**

1. Introduction to Process Safety Management.

The major objective of process safety management is to prevent unwanted releases of hazardous chemicals especially into locations which could expose employees and others to serious hazards. An effective process safety management program requires a systematic approach to evaluating the whole process. Using this approach the process design, process technology, operational and maintenance activities and procedures, nonroutine activities and procedures, emergency preparedness plans and procedures, training programs, and other elements which impact the process are all considered in the evaluation. Process safety management is the proactive identification, evaluation and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures or equipment.

The process safety management standard targets highly hazardous chemicals that have the potential to cause a catastrophic incident. This standard as a whole is to aid employers in their efforts to prevent or mitigate episodic chemical releases that could lead to a catastrophe in the workplace and possibly to the surrounding community. To control these types of hazards, employers need to develop the necessary expertise, experiences, judgement and proactive initiative within their workforce to properly implement and maintain an effective process safety management program as envisioned in the OSHA standard. This OSHA standard is required by the Clean Air Act Amendments as is the Environmental Protection Agency's Risk Management Plan. Employers, who merge the two sets of requirements into their process safety management program, will better assure full compliance with each as well as enhancing their relationship with the local community.

While OSHA believes process safety management will have a positive effect on the safety of employees in workplaces and also offers other potential benefits to employers (increased productivity), smaller businesses which may have limited resources available to them at this time might consider alternative avenues of decreasing the risks associated with highly hazardous chemicals at their workplaces. One method which might be considered is the reduction in the inventory of the highly hazardous chemical. This reduction in inventory will result in a reduction of the risk or potential for a catastrophic incident. Also, employers including small employers may be able to establish more efficient inventory control by reducing the quantities of highly hazardous chemicals on site below the established threshold quantities. This reduction can

be accomplished by ordering smaller shipments and maintaining the minimum inventory necessary for efficient and safe operation. When reduced inventory is not feasible, then the employer might consider dispersing inventory to several locations on site. Dispersing storage into locations where a release in one location will not cause a release in another location is a practical method to also reduce the risk or potential for catastrophic incidents.

2. Employee Involvement in Process Safety Management.

Section 304 of the Clean Air Act Amendments states that employers are to consult with their employees and their representatives regarding the employers efforts in the development and implementation of the process safety management program elements and hazard assessments. Section 304 also requires employers to train and educate their employees and to inform affected employees of the findings from incident investigations required by the process safety management program. Many employers, under their safety and health programs, have already established means and methods to keep employees and their representatives informed about relevant safety and health issues and employers may be able to adapt these practices and procedures to meet their obligations under this standard. Employers who have not implemented an occupational safety and health program may wish to form a safety and health committee of employees and management representatives to help the employer meet the obligations specified by this standard. These committees can become a significant ally in helping the employer to implement and maintain an effective process safety management program for all employees.

3. Process Safety Information.

Complete and accurate written information concerning process chemicals, process technology, and process equipment is essential to an effective process safety management program and to a process hazards analysis. The compiled information will be a necessary resource to a variety of users including the team that will perform the process hazards analysis as required under paragraph (e); those developing the training programs and the operating procedures; contractors whose employees will be working with the process; those conducting the pre-startup reviews; local emergency preparedness planners; and insurance and enforcement officials. The information to be compiled about the chemicals, including process intermediates, needs to be comprehensive enough for an accurate assessment of the fire and explosion characteristics, reactivity hazards, the safety and health hazards to workers, and the corrosion and erosion effects on the process equipment and monitoring tools. Current material safety data sheet (MSDS) information can be used to help meet this requirement which must be supplemented with process chemistry information including runaway reaction and over pressure hazards if applicable.

Process technology information will be a part of the process safety information package and it is expected that it will include diagrams of the type shown in Appendix B of this section as well as employer established criteria for maximum inventory levels for process chemicals; limits beyond which would be considered upset conditions; and a qualitative estimate of the consequences or results of deviation that could occur if operating beyond the established process limits. Employers are encouraged to use diagrams which will help users understand the process.

A block flow diagram is used to show the major process equipment and interconnecting process flow lines and show flow rates, stream composition, temperatures, and pressures when necessary for clarity. The block flow diagram is a simplified diagram.

Process flow diagrams are more complex and will show all main flow streams including valves to enhance the understanding of the process, as well as pressures and temperatures on all feed and product lines within all major vessels, in and out of headers and heat exchangers, and points of pressure and temperature control. Also, materials of construction information, pump capacities and pressure heads, compressor horsepower and vessel design pressures and temperatures are shown when necessary for clarity. In addition, major components of control loops are usually shown along with key utilities on process flow diagrams.

Piping and instrument diagrams (P&IDs) may be the more appropriate type of diagrams to show some of the above details and to display the information for the piping designer and engineering staff. The P&IDs are to be used to describe the relationships between equipment and instrumentation as well as other relevant information that will enhance clarity. Computer software programs which do P&IDs or other diagrams useful to the information package, may be used to help meet this requirement.

The information pertaining to process equipment design must be documented. In other words, what were the codes and standards relied on to establish good engineering practice. These codes and standards are published by such organizations as the American Society of Mechanical Engineers, American Petroleum Institute, American National Standards Institute, National Fire Protection Association, American Society for Testing and Materials, National Board of Boiler and Pressure Vessel Inspectors, National Association of Corrosion Engineers, American Society of Exchange Manufacturers Association, and model building code groups.

In addition, various engineering societies issue technical reports which impact process design. For example, the American Institute of Chemical Engineers has published technical reports on topics such as two phase flow for venting devices. This type of technically recognized report would constitute good engineering practice.

For existing equipment designed and constructed many years ago in accordance with the codes and standards available at that time and no longer in general use today, the employer must document which codes and standards were used and that the design and construction along with the testing, inspection and operation are still suitable for the intended use. Where the process technology requires a design which departs from the applicable codes and standards, the employer must document that the design and construction is suitable for the intended purpose.

4. Process Hazard Analysis.

A process hazard analysis (PHA), sometimes called a process hazard evaluation, is one of the most important elements of the process safety management program. A PHA is an organized and systematic effort to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals. A PHA provides information which will assist employers and employees in making decisions for improving safety and reducing the consequences of unwanted or unplanned releases of hazardous chemicals. A PHA is directed toward analyzing potential causes and consequences of fires, explosions, releases of toxic or flammable chemicals and major spills of hazardous chemicals. The PHA focuses on equipment, instrumentation, utilities, human actions (routine and nonroutine), and external factors that might impact the process. These considerations assist in determining the hazards and potential failure points or failure modes in a process.

The selection of a PHA methodology or technique will be influenced by many factors including the amount of existing knowledge about the process. Is it a process that has been operated for a long period of time with little or no innovation and extensive experience has been generated with its use? Or, is it a new process or one which has been changed frequently by the inclusion of innovative features? Also, the size and complexity of the process will influence the decision as to the appropriate PHA methodology to use. All PHA methodologies are subject to certain limitations. For example, the checklist methodology works well when the process is very stable and no changes are made, but it is not as effective when the process has undergone extensive change. The checklist may miss the most recent changes and consequently the changes would not be evaluated. Another limitation to be considered concerns the assumptions made by the team or analyst. The PHA is dependent on good judgement and the assumptions made during the study need to be documented and understood by the team and reviewer and kept for a future PHA.

The team conducting the PHA need to understand the methodology that is going to be used. A PHA team can vary in size from two people to a number of people with varied operational and technical backgrounds. Some team members may only be a part of the team for a limited time. The team leader needs to be fully knowledgeable in the proper implementation of the PHA methodology that is to be used and should be impartial in the evaluation. The other full or part time team members need to provide the team with exper-

tise in areas such as process technology, process design, operating procedures and practices, including how the work is actually performed, alarms, emergency procedures, instrumentation, maintenance procedures, both routine and nonroutine tasks, including how the tasks are authorized, procurement of parts and supplies, safety and health, and any other relevant subject as the need dictates. At least one team member must be familiar with the process.

The ideal team will have an intimate knowledge of the standards, codes, specifications and regulations applicable to the process being studied. The selected team members need to be compatible and the team leader needs to be able to manage the team, and the PHA study. The team needs to be able to work together while benefiting from the expertise of others on the team or outside the team, to resolve issues, and to forge a consensus on the findings of the study and recommendations.

The application of a PHA to a process may involve the use of different methodologies for various parts of the process. For example, a process involving a series of unit operations of varying sizes, complexities, and ages may use different methodologies and team members for each operation. Then the conclusions can be integrated into one final study and evaluation. A more specific example is the use of a checklist PHA for a standard boiler or heat exchanger and the use of a Hazard and Operability PHA for the overall process. Also, for batch type processes like custom batch operations, a generic PHA of a representative batch may be used where there are only small changes of monomer or other ingredient ratios and the chemistry is documented for the full range and ratio of batch ingredients. Another process that might consider using a generic type of PHA is a gas plant. Often these plants are simply moved from site to site and therefore, a generic PHA may be used for these movable plants. Also, when an employer has several similar size gas plants and no sour gas is being processed at the site, then a generic PHA is feasible as long as the variations of the individual sites are accounted for in the PHA. Finally, when an employer has a large continuous process which has several control rooms for different portions of the process such as for a distillation tower and a blending operation, the employer may wish to do each segment separately and then integrate the final results.

Additionally, small businesses which are covered by this rule, will often have processes that have less storage volume, less capacity, and less complicated than processes at a large facility. Therefore, OSHA would anticipate that the less complex methodologies would be used to meet the process hazard analysis criteria in the standard. These process hazard analyses can be done in less time and with a few people being involved. A less complex process generally means that less data, P&IDS, and process information is needed to perform a process hazard analysis.

Many small businesses have processes that are not unique, such as cold storage lockers or water treatment facilities. Where employer associations have a number of members with such facilities, a generic PHA, evolved from a checklist or what- if questions, could be developed and used by each employer effectively to reflect his/her particular process; this would simplify compliance for them.

When the employer has a number of processes which require a PHA, the employer must set up a priority system of which PHAs to conduct first. A preliminary or gross hazard analysis may be useful in prioritizing the processes that the employer has determined are subject to coverage by the process safety management standard. Consideration should first be given to those processes with the potential of adversely affecting the largest number of employees. This prioritizing should consider the potential severity of a chemical release, the number of potentially affected employees, the operating history of the process such as the frequency of chemical releases, the age of the process and any other relevant factors. These factors would suggest a ranking order and would suggest either using a weighing factor system or a systematic ranking method. The use of a preliminary hazard analysis would assist an employer in determining which process should be of the highest priority and thereby the employer would obtain the greatest improvement in safety at the facility.

Detailed guidance on the content and application of process hazard analysis methodologies is available from the American Institute of Chemical Engineers' Center for Chemical Process Safety.

5. Operating Procedures and Practices.

Operating procedures describe tasks to be performed, data to be recorded, operating conditions to be maintained, samples to be collected, and safety and health precautions to be taken. The procedures need to be technically accurate, understandable to employees, and revised periodically to ensure that they reflect current operations. The process safety information package is to be used as a resource to better assure that the operating procedures and practices are consistent with the known hazards of the chemicals in the process and that the operating parameters are accurate. Operating procedures should be reviewed by engineering staff and operating personnel to ensure that they are accurate and provide practical instructions on how to actually carry out job duties safely.

Operating procedures will include specific instructions or details on what steps are to be taken or followed in carrying out the stated procedures. These operating instructions for each procedure should include the applicable safety precautions and should contain appropriate information on safety implications. For example, the operating procedures addressing operating parameters will contain operating instructions about pressure limits, temperature ranges, flow rates, what to do when an upset condition occurs, what alarms and instruments are pertinent if an upset condition occurs, and other subjects. Another example of using operating instructions to properly implement operating procedures is in starting up or shutting down the process. In these cases, different parameters will be required from those of normal operation. These operating instructions need to clearly indicate the distinctions between startup and normal operations such as the appropriate allowances for heating up a unit to reach the normal operating parameters. Also the operating instructions need to describe the proper method for increasing the temperature of the unit until the normal operating temperature parameters are achieved.

Computerized process control systems add complexity to operating instructions. These operating instructions need to describe the logic of the software as well as the relationship between the equipment and the control system; otherwise, it may not be apparent to the operator.

Operating procedures and instructions are important for training operating personnel. The operating procedures are often viewed as the standard operating practices (SOPs) for operations. Control room personnel and operating staff, in general, need to have a full understanding of operating procedures. If workers are not fluent in English then procedures and instructions need to be prepared in a second language understood by the workers. In addition, operating procedures need to be changed when there is a change in the process as a result of the management of change procedures. The consequences of operating procedure changes need to be fully evaluated and the information conveyed to the personnel. For example, mechanical changes to the process made by the maintenance department (like changing a valve from steel to brass or other subtle changes) need to be evaluated to determine if operating procedures and practices also need to be changed. All management of change actions must be coordinated and integrated with current operating procedures and operating personnel must be oriented to the changes in procedures before the change is made. When the process is shut down in order to make a change, then the operating procedures must be updated before startup of the process.

Training in how to handle upset conditions must be accomplished as well as what operating personnel are to do in emergencies such as when a pump seal fails or a pipeline ruptures. Communication between operating personnel and workers performing work within the process area, such as nonroutine tasks, also must be maintained. The hazards of the tasks are to be conveyed to operating personnel in accordance with established procedures and to those performing the actual tasks. When the work is completed, operating personnel should be informed to provide closure on the job.

6. Employee Training.

All employees, including maintenance and contractor employees, involved with highly hazardous chemicals need to fully understand the safety and health hazards of the chemicals and processes they work with for the protection of themselves, their fellow employees and the citizens of nearby communities. Training conducted in compliance with 1910.1200, the Hazard Communication standard, will help employees to be more knowledgeable about the chemicals they work with as well as familiarize them with reading and

understanding MSDS. However, additional training in subjects such as operating procedures and safety work practices, emergency evacuation and response, safety procedures, routine and nonroutine work authorization activities, and other areas pertinent to process safety and health will need to be covered by an employer's training program.

In establishing their training programs, employers must clearly define the employees to be trained and what subjects are to be covered in their training. Employers in setting up their training program will need to clearly establish the goals and objectives they wish to achieve with the training that they provide to their employees. The learning goals or objectives should be written in clear measurable terms before the training begins. These goals and objectives need to be tailored to each of the specific training modules or segments. Employers should describe the important actions and conditions under which the employee will demonstrate competence or knowledge as well as what is acceptable performance.

Hands-on-training where employees are able to use their senses beyond listening, will enhance learning. For example, operating personnel, who will work in a control room or at control panels, would benefit by being trained at a simulated control panel or panels. Upset conditions of various types could be displayed on the simulator, and then the employee could go through the proper operating procedures to bring the simulator panel back to the normal operating parameters. A training environment could be created to help the trainee feel the full reality of the situation but, of course, under controlled conditions. This realistic type of training can be very effective in teaching employees correct procedures while allowing them to also see the consequences of what might happen if they do not follow established operating procedures. Other training techniques using videos or on-the-job training can also be very effective for teaching other job tasks, duties, or other important information. An effective training program will allow the employee to fully participate in the training process and to practice their skill or knowledge.

Employers need to periodically evaluate their training programs to see if the necessary skills, knowledge, and routines are being properly understood and implemented by their trained employees. The means or methods for evaluating the training should be developed along with the training program goals and objectives. Training program evaluation will help employers to determine the amount of training their employees understood, and whether the desired results were obtained. If, after the evaluation, it appears that the trained employees are not at the level of knowledge and skill that was expected, the employer will need to revise the training program, provide retraining, or provide more frequent refresher training sessions until the deficiency is resolved. Those who conducted the training and those who received the training should also be consulted as to how best to improve the training process. If there is a language barrier, the language known to the trainees should be used to reinforce the training messages and information.

Careful consideration must be given to assure that employees including maintenance and contract employees receive current and updated training. For example, if changes are made to a process, impacted employees must be trained in the changes and understand the effects of the changes on their job tasks (e.g., any new operating procedures pertinent to their tasks). Additionally, as already discussed the evaluation of the employee's absorption of training will certainly influence the need for training.

7. Contractors.

Employers who use contractors to perform work in and around processes that involve highly hazardous chemicals, will need to establish a screening process so that they hire and use contractors who accomplish the desired job tasks without compromising the safety and health of employees at a facility. For contractors, whose safety performance on the job is not known to the hiring employer, the employer will need to obtain information on injury and illness rates and experience and should obtain contractor references. Additionally, the employer must assure that the contractor has the appropriate job skills, knowledge and certifications (such as for pressure vessel welders).

Contractor work methods and experiences should be evaluated. For example, does the contractor conducting demolition work swing loads over operating processes or does the contractor avoid such hazards?

Maintaining a site injury and illness log for contractors is another method employers must use to track and maintain current knowledge of work activities involving contract employees working on or adjacent to covered processes. Injury and illness logs of both the employer's employees and contract employees allow an employer to have full knowledge of process injury and illness experience. This log will also contain information which will be of use to those auditing process safety management compliance and those involved in incident investigations.

Contract employees must perform their work safely. Considering that contractors often perform very specialized and potentially hazardous tasks such as confined space entry activities and nonroutine repair activities it is quite important that their activities be controlled while they are working on or near a covered process. A permit system or work authorization system for these activities would also be helpful to all affected employers. The use of a work authorization system keeps an employer informed of contract employee activities, and as a benefit the employer will have better coordination and more management control over the work being performed in the process area. A well run and well maintained process where employee safety is fully recognized will benefit all of those who work in the facility whether they be contract employees or employees of the owner.

8. Pre-Startup Safety.

For new processes, the employer will find a PHA helpful in improving the design and construction of the process from a reliability and quality point of view. The safe operation of the new process will be enhanced by making use of the PHA recommendations before final installations are completed. P&IDS are to be completed along with having the operating procedures in place and the operating staff trained to run the process before startup. The initial startup procedures and normal operating procedures need to be fully evaluated as part of the pre-startup review to assure a safe transfer into the normal operating mode for meeting the process parameters.

For existing processes that have been shutdown for turnaround, or modification, etc., the employer must assure that any changes other than "replacement in kind" made to the process during shutdown go through the management of change procedures. P&IDS will need to be updated as necessary, as well as operating procedures and instructions. If the changes made to the process during shutdown are significant and impact the training program, then operating personnel as well as employees engaged in routine and nonroutine work in the process area may need some refresher or additional training in light of the changes. Any incident investigation recommendations, compliance audits or PHA recommendations need to be reviewed as well to see what impacts they may have on the process before beginning the startup.

9. Mechanical Integrity.

Employers will need to review their maintenance programs and schedules to see if there are areas where "breakdown" maintenance is used rather than an on-going mechanical integrity program. Equipment used to process, store, or handle highly hazardous chemicals needs to be designed, constructed, installed and maintained to minimize the risk of releases of such chemicals. This requires that a mechanical integrity program be in place to assure the continued integrity of process equipment. Elements of a mechanical integrity program include the identification and categorization of equipment and instrumentation, inspections and tests, testing and inspection frequencies, development of maintenance procedures, training of maintenance personnel, the establishment of criteria for acceptable test results, documentation of test and inspection results, and documentation of manufacturer recommendations as to meantime to failure for equipment and instrumentation.

The first line of defense an employer has available is to operate and maintain the process as designed, and to keep the chemicals contained. This line of defense is backed up by the next line of defense which is the controlled release of chemicals through venting to scrubbers or flares, or to surge or overflow tanks which are designed to receive such chemicals, etc. These lines of defense are the primary lines of defense or means to prevent unwanted releases. The secondary lines of defense would include fixed fire protection systems like sprinklers, water spray, or deluge systems, monitor guns, etc., dikes, designed drainage systems, and other systems which would control or mitigate hazardous chemicals once an

unwanted release occurs. These primary and secondary lines of defense are what the mechanical integrity program needs to protect and strengthen these primary and secondary lines of defenses where appropriate.

The first step of an effective mechanical integrity program is to compile and categorize a list of process equipment and instrumentation for inclusion in the program. This list would include pressure vessels, storage tanks, process piping, relief and vent systems, fire protection system components, emergency shutdown systems and alarms and interlocks and pumps. For the categorization of instrumentation and the listed equipment the employer would prioritize which pieces of equipment require closer scrutiny than others. Meantime to failure of various instrumentation and equipment parts would be known from the manufacturers data or the employer's experience with the parts, which would then influence the inspection and testing frequency and associated procedures. Also, applicable codes and standards such as the National Board Inspection Code, or those from the American Society for Testing and Material, American Petroleum Institute, National Fire Protection Association, American National Standards Institute, American Society of Mechanical Engineers, and other groups, provide information to help establish an effective testing and inspection frequency, as well as appropriate methodologies.

The applicable codes and standards provide criteria for external inspections for such items as foundation and supports, anchor bolts, concrete or steel supports, guy wires, nozzles and sprinklers, pipe hangers, grounding connections, protective coatings and insulation, and external metal surfaces of piping and vessels, etc. These codes and standards also provide information on methodologies for internal inspection, and a frequency formula based on the corrosion rate of the materials of construction. Also, erosion both internal and external needs to be considered along with corrosion effects for piping and valves. Where the corrosion rate is not known, a maximum inspection frequency is recommended, and methods of developing the corrosion rate are available in the codes. Internal inspections need to cover items such as vessel shell, bottom and head; metallic linings; nonmetallic linings; thickness measurements for vessels and piping; inspection for erosion, corrosion, cracking and bulges; internal equipment like trays, baffles, sensors and screens for erosion, corrosion or cracking and other deficiencies. Some of these inspections may be performed by state of local government inspectors under state and local statutes. However, each employer needs to develop procedures to ensure that tests and inspections are conducted properly and that consistency is maintained even where different employees may be involved. Appropriate training is to be provided to maintenance personnel to ensure that they understand the preventive maintenance program procedures, safe practices, and the proper use and application of special equipment or unique tools that may be required. This training is part of the overall training program called for in the standard.

A quality assurance system is needed to help ensure that the proper materials of construction are used, that fabrication and inspection procedures are proper, and that installation procedures recognize field installation concerns. The quality assurance program is an essential part of the mechanical integrity program and will help to maintain the primary and secondary lines of defense that have been designed into the process to prevent unwanted chemical releases or those which control or mitigate a release. "As built" drawings, together with certifications of coded vessels and other equipment, and materials of construction need to be verified and retained in the quality assurance documentation. Equipment installation jobs need to be properly inspected in the field for use of proper materials and procedures and to assure that qualified craftsmen are used to do the job. The use of appropriate gaskets, packing, bolts, valves, lubricants and welding rods need to be verified in the field. Also procedures for installation of safety devices need to be verified, such as the torque on the bolts on ruptured disc installations, uniform torque on flange bolts, proper installation of pump seals, etc. If the quality of parts is a problem, it may be appropriate to conduct audits of the equipment supplier's facilities to better assure proper purchases of required equipment which is suitable for its intended service. Any changes in equipment that become necessary will need to go through the management of change procedures.

10. Nonroutine Work Authorizations.

Nonroutine work which is conducted in process areas needs to be controlled by the employer in a consistent manner. The hazards identified involving the work that is to be accomplished must be communicated to those doing the work, but also to those operating personnel whose work could affect the safety of the process. A work authorization notice or permit must have a procedure that describes the steps the

maintenance supervisor, contractor representative or other person needs to follow to obtain the necessary clearance to get the job started. The work authorization procedures need to reference and coordinate, as applicable, lockout/tagout procedures, line breaking procedures, confined space entry procedures and hot work authorizations. This procedure also needs to provide clear steps to follow once the job is completed in order to provide closure for those that need to know the job is now completed and equipment can be returned to normal.

11. Managing Change.

To properly manage changes to process chemicals, technology, equipment and facilities, one must define what is meant by change. In this process safety management standard, change includes all modifications to equipment, procedures, raw materials and processing conditions other than "replacement in kind". These changes need to be properly managed by identifying and reviewing them prior to implementation of the change. For example, the operating procedures contain the operating parameters (pressure limits, temperature ranges, flow rates, etc.) and the importance of operating within these limits. While the operator must have the flexibility to maintain safe operation within the established parameters, any operation outside of these parameters requires review and approval by a written management of change procedure.

Management of change covers such as changes in process technology and changes to equipment and instrumentation. Changes in process technology can result from changes in production rates, raw materials, experimentation, equipment unavailability, new equipment, new product development, change in catalyst and changes in operating conditions to improve yield or quality. Equipment changes include among others change in materials of construction, equipment specifications, piping pre-arrangements, experimental equipment, computer program revisions and changes in alarms and interlocks. Employers need to establish means and methods to detect both technical changes and mechanical changes.

Temporary changes have caused a number of catastrophes over the years, and employers need to establish ways to detect temporary changes as well as those that are permanent. It is important that a time limit for temporary changes be established and monitored since, without control, these changes may tend to become permanent. Temporary changes are subject to the management of change provisions. In addition, the management of change procedures are used to insure that the equipment and procedures are returned to their original or designed conditions at the end of the temporary change. Proper documentation and review of these changes is invaluable in assuring that the safety and health considerations are being incorporated into the operating procedures and the process.

Employers may wish to develop a form or clearance sheet to facilitate the processing of changes through the management of change procedures. A typical change form may include a description and the purpose of the change, the technical basis for the change, safety and health considerations, documentation of changes for the operating procedures, maintenance procedures, inspection and testing, P&IDS, electrical classification, training and communications, pre-startup inspection, duration if a temporary change, approvals and authorization. Where the impact of the change is minor and well understood, a check list reviewed by an authorized person with proper communication to others who are affected may be sufficient. However, for a more complex or significant design change, a hazard evaluation procedure with approvals by operations, maintenance, and safety departments may be appropriate. Changes in documents such as P&IDS, raw materials, operating procedures, mechanical integrity programs, electrical classifications, etc., need to be noted so that these revisions can be made permanent when the drawings and procedure manuals are updated. Copies of process changes need to be kept in an accessible location to ensure that design changes are available to operating personnel as well as to PHA team members when a PHA is being done or one is being updated.

12. Investigation of Incidents.

Incident investigation is the process of identifying the underlying causes of incidents and implementing steps to prevent similar events from occurring. The intent of an incident investigation is for employers to learn from past experiences and thus avoid repeating past mistakes. The incidents for which OSHA expects employers to become aware and to investigate are the types of events which result in or could reasonably have resulted in a catastrophic release. Some of the events are sometimes referred to as "near misses," meaning that a serious consequence did not occur, but could have.

Employers need to develop in-house capability to investigate incidents that occur in their facilities. A team needs to be assembled by the employer and trained in the techniques of investigation including how to conduct interviews of witnesses, needed documentation and report writing. A multi-disciplinary team is better able to gather the facts of the event and to analyze them and develop plausible scenarios as to what happened, and why. Team members should be selected on the basis of their training, knowledge and ability to contribute to a team effort to fully investigate the incident. Employees in the process area where the incident occurred should be consulted, interviewed or made a member of the team. Their knowledge of the events form a significant set of facts about the incident which occurred. The report, its findings and recommendations are to be shared with those who can benefit from the information. The cooperation of employees is essential to an effective incident investigation. The focus of the investigation should be to obtain facts, and not to place blame. The team and the investigation process should clearly deal with all involved individuals in a fair, open and consistent manner.

13. Emergency Preparedness.

Each employer must address what actions employees are to take when there is an unwanted release of highly hazardous chemicals. Emergency preparedness or the employer's tertiary (third) lines of defense are those that will be relied on along with the secondary lines of defense when the primary lines of defense which are used to prevent an unwanted release fail to stop the release. Employers will need to decide if they want employees to handle and stop small or minor incidental releases. Whether they wish to mobilize the available resources at the plant and have them brought to bear on a more significant release. Or whether employers want their employees to evacuate the danger area and promptly escape to a preplanned safe zone area, and allow the local community emergency response organizations to handle the release. Or whether the employer wants to use some combination of these actions. Employers will need to select how many different emergency preparedness or tertiary lines of defense they plan to have and then develop the necessary plans and procedures, and appropriately train employees in their emergency duties and responsibilities and then implement these lines of defense.

Employers at a minimum must have an emergency action plan which will facilitate the prompt evacuation of employees due to an unwanted release of a highly hazardous chemical. This means that the employer will have a plan that will be activated by an alarm system to alert employees when to evacuate and, that employees who are physically impaired, will have the necessary support and assistance to get them to the safe zone as well. The intent of these requirements is to alert and move employees to a safe zone quickly. Delaying alarms or confusing alarms are to be avoided. The use of process control centers or similar process buildings in the process area as safe areas is discouraged. Recent catastrophes have shown that a large life loss has occurred in these structures because of where they have been sited and because they are not necessarily designed to withstand over-pressures from shockwaves resulting from explosions in the process area.

Unwanted incidental releases of highly hazardous chemicals in the process area must be addressed by the employer as to what actions employees are to take. If the employer wants employees to evacuate the area, then the emergency action plan will be activated. For outdoor processes where wind direction is important for selecting the safe route to a refuge area, the employer should place a wind direction indicator such as a wind sock or pennant at the highest point that can be seen throughout the process area. Employees can move in the direction of cross wind to upwind to gain safe access to the refuge area by knowing the wind direction.

If the employer wants specific employees in the release area to control or stop the minor emergency or incidental release, these actions must be planned for in advance and procedures developed and implemented. Preplanning for handling incidental releases for minor emergencies in the process area needs to be done, appropriate equipment for the hazards must be provided, and training conducted for those employees who will perform the emergency work before they respond to handle an actual release. The employer's training program, including the Hazard Communication standard training is to address the training needs for employees who are expected to handle incidental or minor releases.

Preplanning for releases that are more serious than incidental releases is another important line of defense to be used by the employer. When a serious release of a highly hazardous chemical occurs, the employer through preplanning will have determined in advance what actions employees are to take. The evacuation of the immediate release area and other areas as necessary would be accomplished under the emergency action plan. If the employer wishes to use plant personnel such as a fire brigade, spill control team, a hazardous materials team, or use employees to render aid to those in the immediate release area and control or mitigate the incident, these actions are covered by §1910.120, the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard. If outside assistance is necessary, such as through mutual aid agreements between employers or local government emergency response organizations, these emergency responders are also covered by HAZWOPER. The safety and health protections required for emergency responders are the responsibility of their employers and of the on-scene incident commander.

Responders may be working under very hazardous conditions and therefore the objective is to have them competently led by an on-scene incident commander and the commander's staff, properly equipped to do their assigned work safely, and fully trained to carry out their duties safely before they respond to an emergency. Drills, training exercises, or simulations with the local community emergency response planners and responder organizations is one means to obtain better preparedness. This close cooperation and coordination between plant and local community emergency preparedness managers will also aid the employer in complying with the Environmental Protection Agency's Risk Management Plan criteria.

One effective way for medium to large facilities to enhance coordination and communication during emergencies for on plant operations and with local community organizations is for employers to establish and equip an emergency control center. The emergency control center would be sited in a safe zone area so that it could be occupied throughout the duration of an emergency. The center would serve as the major communication link between the on-scene incident commander and plant or corporate management as well as with the local community officials. The communication equipment in the emergency control center should include a network to receive and transmit information by telephone, radio or other means. It is important to have a backup communication network in case of power failure or one communication means fails. The center should also be equipped with the plant layout and community maps, utility drawings including fire water, emergency lighting, appropriate reference materials such as a government agency notification list, company personnel phone list, SARA Title III reports and material safety data sheets, emergency plans and procedures manual, a listing with the location of emergency response equipment, mutual aid information, and access to meteorological or weather condition data and any dispersion modeling data.

14. Compliance Audits.

Employers need to select a trained individual or assemble a trained team of people to audit the process safety management system and program. A small process or plant may need only one knowledgeable person to conduct an audit. The audit is to include an evaluation of the design and effectiveness of the process safety management system and a field inspection of the safety and health conditions and practices to verify that the employer's systems are effectively implemented. The audit should be conducted or lead by a person knowledgeable in audit techniques and who is impartial towards the facility or area being audited. The essential elements of an audit program include planning, staffing, conducting the audit, evaluation and corrective action, follow-up and documentation.

Planning in advance is essential to the success of the auditing process. Each employer needs to establish the format, staffing, scheduling and verification methods prior to conducting the audit. The format should be designed to provide the lead auditor with a procedure or checklist which details the requirements of each section of the standard.

The names of the audit team members should be listed as part of the format as well. The checklist, if properly designed, could serve as the verification sheet which provides the auditor with the necessary information to expedite the review and assure that no requirements of the standard are omitted. This verification sheet format could also identify those elements that will require evaluation or a response to correct deficiencies. This sheet could also be used for developing the follow-up and documentation requirements.

The selection of effective audit team members is critical to the success of the program. Team members should be chosen for their experience, knowledge, and training and should be familiar with the processes and with auditing techniques, practices and procedures. The size of the team will vary depending on the size and complexity of the process under consideration. For a large, complex, highly instrumented plant, it may be desirable to have team members with expertise in process engineering and design, process chemistry, instrumentation and computer controls, electrical hazards and classifications, safety and health disciplines, maintenance, emergency preparedness, warehousing or shipping, and process safety auditing. The team may use part-time members to provide for the depth of expertise required as well as for what is actually done or followed, compared to what is written.

An effective audit includes a review of the relevant documentation and process safety information, inspection of the physical facilities, and interviews with all levels of plant personnel. Utilizing the audit procedure and checklist developed in the preplanning stage, the audit team can systematically analyze compliance with the provisions of the standard and any other corporate policies that are relevant. For example, the audit team will review all aspects of the training program as part of the overall audit. The team will review the written training program for adequacy of content, frequency of training, effectiveness of training in terms of its goals and objectives as well as to how it fits into meeting the standard's requirements, documentation, etc. Through interviews, the team can determine the employee's knowledge and awareness of the safety procedures, duties, rules, emergency response assignments, etc. During the inspection, the team can observe actual practices such as safety and health policies, procedures, and work authorization practices. This approach enables the team to identify deficiencies and determine where corrective actions or improvements are necessary.

An audit is a technique used to gather sufficient facts and information, including statistical information, to verify compliance with standards. Auditors should select as part of their preplanning a sample size sufficient to give a degree of confidence that the audit reflects the level of compliance with the standard. The audit team, through this systematic analysis, should document areas which require corrective action as well as those areas where the process safety management system is effective and working in an effective manner. This provides a record of the audit procedures and findings, and serves as a baseline of operation data for future audits. It will assist future auditors in determining changes or trends from previous audits.

Corrective action is one of the most important parts of the audit. It includes not only addressing the identified deficiencies, but also planning, follow-up, and documentation. The corrective action process normally begins with a management review of the audit findings. The purpose of this review is to determine what actions are appropriate, and to establish priorities, timetables, resource allocations and requirements and responsibilities. In some cases, corrective action may involve a simple change in procedure or minor maintenance effort to remedy the concern. Management of change procedures need to be used, as appropriate, even for what may seem to be a minor change. Many of the deficiencies can be acted on promptly, while some may require engineering studies or in-depth review of actual procedures and practices. There may be instances where no action is necessary and this is a valid response to an audit finding. All actions taken, including an explanation where no action is taken on a finding, needs to be documented as to what was done and why.

It is important to assure that each deficiency identified is addressed, the corrective action to be taken noted, and the audit person or team responsible be properly documented by the employer. To control the corrective action process, the employer should consider the use of a tracking system. This tracking system might include periodic status reports shared with affected levels of management, specific reports such as completion of an engineering study, and a final implementation report to provide closure for audit findings that have been through management of change, if appropriate, and then shared with affected employees and management. This type of tracking system provides the employer with the status of the corrective action. It also provides the documentation required to verify that appropriate corrective actions were taken on deficiencies identified in the audit.

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HMEP PREVENTION CURRICULUM GUIDELINES FOCUS GROUP MEETING

Summary Report

INTRODUCTION

Under the Hazardous Materials Transportation Uniform Safety Act (HMTUSA) Section 17, the Department of Transportation (DOT) has lead responsibility for developing a **National Curriculum for Hazardous Materials Training**. The goal of this program is to provide practical and useful support to State, Tribal, and local training systems in their mission to prepare employees who respond to and who plan for response to hazardous materials emergencies.

This curriculum effort includes development of the *Guidelines for Public Sector Hazardous Materials Training (Guidelines)*, which identifies requirements for various training audiences. The current edition of the *Guidelines* addresses response and planning training, but does not include assistance for employees who prevent or mitigate the effects of hazardous materials emergencies. Over the next year, the HMEP grantee community and author team will prepare guidance for prevention training that will be included in the 1998 edition of the *Guidelines*.

On February 28-March 2, 1997, the prevention curriculum author team met at the National Emergency Training Center (NETC) in Emmitsburg, Maryland, to continue work on the project. (A list of participants is presented as Exhibit 1.) During the meeting, the author team refined previous work products and conducted the final steps in a formal methodology designed to identify training requirements for all audiences with a role in hazardous materials prevention. This report summarizes the results of the meeting.

BACKGROUND

Training requirements for the HMEP *Guidelines* project have been defined as a comprehensive list of training objectives for each major competency area in the curriculum. The methodology adopted by the author team to develop these training objectives is depicted in Exhibit 2 and summarized as follows:

1. Identify an extensive list of persons by job title/function who perform work impacting hazardous materials prevention.

2. Analyze this list to identify broad functional areas or groupings of related job titles/functions (competencies).

3. Within each of these broadly defined functional areas, identify subgroups of audiences with significantly similar prevention training requirements (audience categories).

4. Identify job outputs produced by each of these audience groups that have the greatest impact on prevention activities (major accomplishments).

5. Develop a step-by-step list of behaviors that successful performers follow to achieve each of these major

accomplishments.

6. Revise these behavior statements into measurable training objectives that define the training requirements for the various audience groups.

During previous meetings, the prevention author team described the purpose and scope of the curriculum, and identified appropriate goals and activities for state and local hazardous materials prevention programs. In addition, draft lists of competency areas, audience categories, and major accomplishments were developed and refined. This analysis formed the basis for individual team member assignments to develop draft behavior statements for each major accomplishment in 16 different audience categories. Work included research into relevant resource materials and interviews with subject matter experts, as appropriate. (For more information on previous work efforts and products, see the Summary Report for the January 25-27, 1997 meeting.)

FOCUS GROUP RESULTS

The purpose of the prevention author team meeting was to 1) refine the training classification system developed previously, and 2) build on team member assignments to identify required behaviors in each audience category. The results will be used in subsequent work to prepare training objectives for the curriculum and to write the prevention section of the *Guidelines*. The meeting goals were accomplished through team member participation in large group discussions, individual and small group work, and plenary session reviews of draft work products. The agenda for the meeting is presented as Exhibit 3.

First, the team conducted extensive discussions to refine the 16 training audience categories developed previously. The result was a significant consolidation into four broad competency areas, currently envisioned as chapter headings for the *Prevention Guidelines*:

Senior Management Policy Making
Prevention Program Management
Hazardous Materials Design, Plans Review, and Construction
Safe Operations and Inspection

These functional categories define groups of audiences that have significantly similar prevention training requirements, even if their roles and responsibilities at work seem different. That's because the purpose of the prevention curriculum is not to train individuals in their professional and/or technical specialty areas, or to provide instruction on specific facility hazards, occupancy types, production processes, organizational requirements, etc. Instead, the goal of the curriculum is to provide the knowledge and skills that diverse audience groupings need to

1. recognize the purpose, benefits, and scope of prevention requirements and activities,
2. assess their own personal and organizational needs related to prevention, and
3. apply general prevention competencies to their unique job situations.

Some of the key concepts and assumptions leading to the consolidation of training requirements into four competency areas can be summarized as follows:

General laborers at hazardous materials facilities need training on

employee safety plans, chemical hazards, job-specific standards and procedures, etc. However, this requirement is best met by addressing training for production process managers, functional managers, safety officers, and other private sector personnel who oversee and supervise their work.

Depending on the size and complexity of facility operations, the prevention training requirements of production/process safety managers and other safety and health personnel may significantly exceed that of line supervisors and other functional managers. However, most facilities are small, and managers often must wear several "hats." Since the greatest training need exists in small businesses, the author team believes that separating these roles may be counterproductive for the curriculum.

The nature and scope of prevention program activities vary dramatically among federal, state, and local government agencies, and among different types of private sector industries and facilities. However requirements for prevention program leadership and senior level management in these organizations can be defined somewhat generically if it is assumed that staff, consultants, and other technical experts are available to provide advice and to implement decisions, as necessary.

Local government and private sector personnel typically have very different roles in prevention-related activities (e.g., plant design versus plans review, safety management versus inspection). However, both groups can be considered to have basically the same training requirements relative to prevention since they both must be able to determine regulatory requirements, recognize potential safety problems, identify prevention opportunities, and so forth in their assigned areas of responsibility.

Many different types of consultants and technical experts participate in prevention activities. The competencies they need to do their jobs vary widely, depending on their role in the process and the unique needs of the client. However, training requirements relative to prevention fall in the same functional areas as the personnel they work for: policy making, program management and implementation, facility and process design and construction, plans review, safe operations, and inspection.

Transporters have prevention program needs--regulatory requirements, analytical techniques, prevention activities, etc.-- that differ from fixed facilities. However, both groups must be able to apply generic prevention principles and techniques to their own specific business situations. Thus, audiences from fixed facilities and transportation companies can be viewed as having similar prevention training requirements.

The function of public education suggests training for many different audiences, including individual citizens, community service organizations, advocacy groups, public information officers, media representatives, and others with a role in the process. However, the author team believes that training for these groups is best accomplished through appropriate instruction for Senior Management Policy Makers and Prevention Program Managers, who will, in turn, ensure that public education programs are properly designed, developed, and implemented.

In summary, the author team noted important distinctions between the prevention competencies required in the design and construction phase of plant/facility operations and those needed to ensure safety in ongoing production processes. Similar differences were noted in the training needs of management and operations personnel. Among

managers, "policy makers" (organizational executives and senior level managers) and "prevention program managers" (persons who direct specific prevention activities) are considered to have separate training needs. (Note: team members plan to reexamine this latter distinction during the next meeting).

Other differences among prevention audiences are considered less important for classifying training requirements, thus permitting a consolidation of the original 16 categories. This approach supports the author team's preference for identifying broad audience categories that define comprehensive sets of training requirements. Hazardous materials program managers, course developers, and instructors can then select and/or modify these competency requirements to best meet the needs of specific groups or training activities.

During the meeting, the four competency categories provided the framework for subsequent small group work to identify major prevention job accomplishments and to describe specific behaviors for achieving each of those accomplishments. Work included a description of related audiences and appropriate training methodologies for each competency area. The results of this work can be found in Exhibit 4 of this report.

NEXT STEPS

The information contained in Exhibit 4 clarifies the nature and scope of the hazardous materials prevention training requirement. It will form the basis for work by a subgroup of the author team to develop a draft of the Prevention Guidelines. In this effort, team members will analyze the audience behaviors from an instructional perspective to prepare an initial cut of training objectives for each competency area and a narrative description of the curriculum. Key aspects of this planned work are noted as follows:

The classification of major accomplishments for two competency areas (Hazardous Materials Design, Plans Review, and Construction; Safe Operations and Inspection) will be reexamined in light of comments made by team members during the plenary session review of small group results on the final day of the meeting.

The training objectives prepared for the draft report will attempt to describe the knowledge and skills needed by audience members to successfully perform the behaviors identified in Exhibit 4. The structure and content of these statements may or may not closely parallel that identified for the behaviors.

The level of detail captured in the training objective statements may vary among competency areas based on the author team's judgement of the information needs of state and local hazardous materials training program managers.

The narrative description of the curriculum will include a summary of federal prevention policy and major regulatory requirements. Initial research in this area will be done by DeeEll Fifield in preparation for the next team meeting. More detailed reviews of NFPA-1, major OSHA regulations (1910.119, 1910.38), EPA CFR 40 Part 68, Uniform Fire Code 80, DOT 49 CFR Part 172, and perhaps other authorities will be captured in an appendix to the Guidelines. A bibliography will also be attached.

The draft Prevention Guidelines will be sent to all author team members in advance of the next planned meeting in June, 1997. At that time, team members will review and modify the draft materials as

necessary, and recommend further steps to improve the Guidelines and ensure its acceptance by state and local training program managers. All changes will be incorporated into a second draft produced by EMI in PageMaker software for broad dissemination to the hazardous materials training community.

During the June meeting, the author team will also consider strategies for briefing HMEP grantees and other interested groups on the new Prevention Guidelines. One approach under consideration includes the pilot testing of presentation materials at hazardous materials conferences in the fall. Author team members and others could then use these materials at other venues to explain the Guidelines and to solicit feedback for later editions of the document. This strategy is summarized in the Prevention Guidelines Development Schedule (Exhibit 5).

Exhibit 1
PREVENTION CURRICULUM WORK TEAM

Tom Aurnhammer, NM (505)599-1437
*Pat Coughlin, KS (913) 268-1311
Jim Craig, PA (717) 364-5457
*Gerald Dickens, NY (718) 266-4565
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Stephen E. Grainer, VA (804) 674-2454
Steve Hausotter, OR (503) 625-2065
Bev Kaiser, IA (515) 281-3231
Bill Lewis, NETC (301) 447-1009
Paul M. Maniscalco, NJ (201) 467-3175
Milton Painter, VA (540) 436-3573
Jon Pearson, PA (717) 794-2269
John C. Pine, LA (504) 388-1075
Henry Renfrew, CT (860) 276-1919
J. Benjamin Roy, Jr., NFPA (302) 653-5712
*Dennis Rubin, AL (334) 793-0372
Tom Siegfried, FL (407) 696-7900
Lynn A. Steffensen, UT (801) 538-3722

*Unable to attend February 28, 1997 meeting.

Exhibit 2
PROJECT METHODOLOGY

	Examples
COMPETENCY Broad functional area/grouping of related job titles/functions	Plant/Facility Operations Consulting/Technical Support Compliance/Enforcement (Risk Management) Legislative/Policy Makers Public Education
TRAINING AUDIENCE LIST All job titles that need prevention training related to a specific competency	Elected officials Safety Officer Facility manager Inspectors SERC/LEPC members Truck drivers
TRAINING AUDIENCE CATEGORY Subset of job titles with similar training requirements (May be one or more)	Local Government Officials Advocacy Groups Inspection Plant/Facility Functional Managers Community Support Services

MAJOR ACCOMPLISHMENTS Important work outputs with significant impact on prevention (nouns)	Compliance With Established Work Procedures Plant/Facility Prevention Policy Risk/Benefit Analysis Dissemination of Public Information Compliance Audit
BEHAVIORS/OBJECTIVES Tasks/subtasks that successful performers follow to achieve the major accomplishment (verbs)	Identify prevention problems/opportunities Prepare inspection checklist and schedule Assess public information media and channels Gather and interpret technical data Test and validate work plan

Exhibit 3
AGENDA

HMEP Prevention Curriculum Meeting
February 28-March 2, 1997

Friday Morning	**INTRODUCTION AND PROJECT OVERVIEW** Background, Methodology, and Agenda Review/Refinement of Previous Results Category Descriptions
Friday Afternoon	**ANALYSIS OF BEHAVIORS/SESSION 1** Activity Introduction and Instructions Small Group Work/Report Preparation • Plant/Facility Operations • Compliance/Enforcement (Risk Management) • Local Government Officials/LEPCs Plenary Session Review
Saturday Morning	**ANALYSIS OF BEHAVIORS/SESSION 2** Small Group Work/Report Preparation • Consulting/Technical Support • Federal/State Government Officials/SERCs • Private Sector Executives/Advocacy Groups Plenary Session Review
Saturday Afternoon	**ANALYSIS OF BEHAVIORS/SESSION 3** Small Group Work/Report Preparation • Policy Authors (3 Categories) • Community Support Services • Public Plenary Session Review
Sunday Morning	**SUMMARY AND NEXT STEPS** Work Group Summaries Curriculum Priorities, Issues, Recommendations Project Planning and Administration

Exhibit 4
COMPETENCY CATEGORIES AND BEHAVIORS

Competency: Senior Management Policy Maker

Category Description: The training audience is composed of senior management officials from the public sector, private sector, and non-profit organizations. They are responsible for the development of prevention program policy for their organization, program oversight, analysis of program outcomes, interagency coordination, training, and applications of prevention program policy.

Audience Description: Government, private sector, and non-profit organization chief executive officers, elected officials, and members of public boards, commissions, or committees. The group includes, as an illustration, private facility managers, LEPC members, local planning board members, chief executive officers of utilities, police chiefs, fire chiefs, agency managers, school boards, bank administrators, investment firm chief operating officers, hospital administrators, newspaper or television media officials, officers of professional groups, and union presidents.

Prevention Training Considerations:

- Training should include one to three hours of instruction.
- Training should emphasize the need for prevention and how various organizations can contribute to creating a disaster resistant community.
- Training should encourage the coordination of agency and organizational efforts to strengthen prevention programs and activities related to chemical accidents.
- Audiences should be heterogeneous, reflecting the participation of different organizations from the public, private, and non-profit sectors in hazardous materials prevention.
- Instructional methodologies should include small group activities that encourage participant interaction and support resolution of conflicts.
- Course materials should include examples of prevention initiatives from many types of businesses, e.g., public utilities, transporters of chemicals, industrial production facilities, hospitals, sewerage treatment facilities, truck stops, and pipelines.

Major Accomplishments	**Behaviors**
Prevention Program Oversight	Ensure program goals and objectives Identify relative goals and objectives Organize staff Review and interpret prevention Identify prevention elements of emergency management systems Identify and interpret prevention roles in emergency management system
Development of Policy	Understand legal mandates Understand professional standards Understand sound business practices

Analysis/Interpretation of Prevention Program	Clarify scope and intent of policy Assess effects of policy Identify roles and integration into the prevention program Identify additional technical resources Adapt interpretation to viable prevention program Approve evaluation mechanism for prevention
Interagency Coordination	Establish interface within prevention system Create committees and task forces Organize staff to implement goals Ensure integration of efforts Resolve and mediate conflicts Provide "hand holding" and "touchy feely" management Inspire a shared vision of prevention program Champion advocacy efforts for building disaster resistant communities
Training	Provide prevention training and authorization Approve resource allocation Establish prevention program training standards Identify and approve prevention program goals
Application of Policy	Allocate resources (budget, fees, fines, etc.) Direct the enforcement of the prevention program Evaluate program funding Identify prevention funding sources Promote prevention program (marketing)

Competency: Prevention Program Management

Category Description: This training category includes supervisory personnel in public, private, or non-profit operations that have a direct role in producing, transporting, or storing hazardous materials, or managing emergency response activities. They are responsible for developing and implementing prevention programs for their organizations. They supervise prevention programs, implement prevention policy established by management, analyze the impact of the prevention program, develop interagency coordination, provide training, and apply prevention policy.

Audience Description: Government, private sector, and non-profit organization managers that have some direct role in supervising hazardous materials prevention programs. The group includes, as an illustration, private facility safety managers, hazardous materials coordinators, hospital safety managers, utility safety officers, police chiefs, fire chiefs, health department directors, state environmental hazardous materials prevention officers, state hazardous material emergency management program

directors, sheriffs, and local building or zoning officials.

Prevention Training Considerations:

- Training should include one to three days of instruction, with modules delivered progressively.
- Training should emphasize strategies and methods for creating, implementing, and evaluating prevention programs that contribute to creating a disaster resistant community.
- Training should encourage the coordination of agency and organizational efforts to strengthen prevention programs and activities related to chemical accidents.
- Audiences should be heterogeneous, reflecting the participation of different organizations from the public, private, and non-profit sectors in hazardous materials prevention.
- Instructional methodologies should include small group activities that encourage participant interaction and support resolution of conflicts.
- Course materials should include examples of prevention initiatives from many types of businesses, e.g., public utilities, transporters of chemicals, industrial production facilities, hospitals, sewerage treatment facilities, truck stops, and pipelines. Case studies should highlight the implementation of prevention initiatives, including practical strategies.

Major Accomplishments	**Behaviors**
Implementation of Policy	Ensure conformance with legal mandates Ensure and integrate professional standards Adapt program policies to reflect sound business practices in conformity with legal mandates and professional standards Ensure integration of policy
Analysis/interpretation of prevention program	Monitor scope and intent of policy Evaluate effects of policy Integrate roles into the prevention program Utilize technical resources Apply prevention program procedures Evaluate effectiveness of program
Application of Policy	Coordinate allocated resources
Prevention Program Supervision	Recommend program goals, objectives, and action plans Collect and interpret prevention data Assign tasks Resolve conflicts Ensure program evaluation and feedback Implement plan
Interagency Coordination	Interface with prevention system Facilitate/participate on committees and task forces Implement goals Monitor and adjust integration efforts Implement shared vision

Training	Develop and deliver program training Design training Utilize allocated resources Evaluate training resources Market training opportunities Carry out program goals and follow standards Establish program objectives

Competency: Hazmat Design, Plans Review, and Construction

Category Description:

Audience Description: Architects, Engineers, Plan Reviewers, and Contractors

Prevention Training Considerations:

Major Accomplishment: Design approved plans, develop systems, and construct facilities that meet prevention codes.

Behavior Statements:

1.0 Identify prevention codes as factors in, and set parameters for, every project.

2.0 Develop and present as part of the design submission for each project a prevention code search process (checklist) that captures key code design information.

3.0 Teach staff about prevention code intentions, approaches, and procedures.

4.0 Establish staff consultation with local officials to ascertain or clarify prevention code issues.

5.0 Write instructions in specifications that require contractor compliance with applicable prevention codes.

6.0 Develop prevention code-related procedures addressing, for example, material approvals, specification text, and recommendations for text and procedural changes.

7.0 Include a prevention code data sheet as part of the required documents.

Competency: Safe Operation and Inspection

Category Description:

Audience Description:

Major Accomplishment: Inspection and safe operation in compliance with prevention codes.

Behavior Statements: X-Refs

1.0	Identify, evaluate, prevent, and mitigate releases of hazardous materials.	119(a)
2.0	Develop a procedure or checklist which details the requirements of the prevention codes.	
3.0	Identify and compile needed safety information.	119(d)
4.0	Identify the purpose and steps for conducting a process hazards analysis, ensuring consideration of worst case scenarios.	119(e)
5.0	Identify and analyze the potential hazards associated with the processing or handling of hazardous materials.	119(e)

6.0	Develop, implement, and update written operating procedures that provide clear instructions for safely conducting activities.	119(f)
7.0	Identify and update inspection and operating procedures.	119(f)
8.0	Identify, develop and conduct training to comply with regulatory requirements.	119(g)
9.0	Identify, develop, and implement a screening process to hire and use contractors who accomplish desired job tasks without compromising the safety and health of employees.	119(h)
10.0	Identify, develop, and implement a pre-startup safety review for new facilities and for facilities modified enough to require a change in the safety information.	119(l)
11.0	Identify, develop, and implement the elements of a mechanical integrity program, including: identification and categorization of equipment and instrumentation, inspections and tests, testing and inspection frequencies, maintenance procedures, training of maintenance personnel, establishment of criteria for acceptable test results, documentation of test and inspection results, and documentation of manufacturer recommendations on meantime to failure for equipment and instrumentation.	119(j)
12.0	Examine and test fixed fire protection systems per NFPA-1.	119(l)
13.0	Identify, develop, and implement written procedures for managing change to operations that affects safety.	
14.0	Identify, develop, and implement incident investigation procedures.	119(m)
15.0	Identify, develop and implement emergency plans to comply with regulatory requirements.	119(n)
16.0	Identify the steps in an effective audit, including a review of relevant documentation and process safety information, inspection of physical facilities, and interviews with all levels of plant personnel.	119(o)
17.0	Identify the essential elements of an audit program, including planning, staffing, conducting the audit, evaluation, corrective action, follow-up, and Documentation.	119(o)
18.0	Identify any major changes in processes that impact prevention requirements.	
19.0	If required, ensure that a risk management plan has been developed, implemented, and coordinated with other agencies.	
20.0	Identify and deliver minimum levels of training for compliance and enforcement personnel.	
21.0	Identify existing authority to issue violations of prevention codes and ordinances.	
22.0	Identify and adopt codes and ordinances, where needed, to establish authority to issue violations of prevention codes and ordinances.	
23.0	Identify and correct violations of prevention codes and ordinances.	
24.0	Identify relevant safety and health issues.	
25.0	Identify training and educational requirements.	
26.0	Identify obligations mandated in various occupational safety, health, and environmental programs.	
27.0	Identify a trained person and/or assemble a trained team to audit the process safety management system and program.	
28.0	Evaluate the design and effectiveness of the process safety management system.	

29.0	Conduct a field inspection of safety and health conditions and practices.

Exhibit 5
PREVENTION GUIDELINES DEVELOPMENT SCHEDULE

Feb. 28-Mar. 2, 1997	Full author team meeting at NETC.
March 3-May, 1997	Prepare and distribute prevention meeting report (Pearson). Write first draft of the Prevention Guidelines (Kaiser, Pearson, Steffensen); send copies to author team members (EMI). Prepare draft presentation outline and materials for briefing users of the Guidelines; send copies to author team members (EMI). Review draft materials before June meeting (author team).
June 6-8, 1997	Full author team meeting (location to be determined) to: • Review and revise first draft of Guidelines. • Review and revise presentation strategy and materials.
July-August, 1997	Develop second draft of Prevention Guidelines (EMI, Pearson) and solicit informal external reaction (EMI and author team members). Produce Guidelines in PageMaker for formal external review, and prepare pilot presentation materials (EMI).
Sept. 24-26, 1997	Author team meeting to: • Review second draft of the Guidelines. • Practice and pilot test presentation strategy and materials. • Recommend changes to the presentation strategy and materials.
October, 1997	Revise presentation strategy and materials (EMI). Release formal review draft of Guidelines for three-month public comment period. Material will be distributed to HMEP grantees, relevant professional associations, and the federal community. Comments are due by the end of January, 1998.
February, 1998	Full author team meeting, site and date to be determined, to review all comments received and to finalize the Prevention Guidelines.
April, 1998	Release final Prevention Guidelines to HMEP grantees in the 1998 edition of Guidelines for Public Sector Hazardous Materials Training.

HMEP
- Background
- Calendar
- Federal Grant Programs
- Training Curriculum Guidelines
- Curriculum Working Reports
- Federal Contacts
- Grantee Contacts
- Hazmat Links

Hazmat Guide

HMEP PREVENTION CURRICULUM GUIDELINES FOCUS GROUP MEETING

Summary Report
January 1997

INTRODUCTION

Under the Hazardous Materials Transportation Uniform Safety Act (HMTUSA) Section 17, the Department of Transportation (DOT) has lead responsibility for developing a **National Curriculum for Hazardous Materials Training**. The goal of this program is to provide practical and useful support to State, Tribal, and local training systems in their mission to prepare public sector employees who respond to and who plan for the response to hazardous materials emergencies.

This curriculum effort includes the development of a document entitled *Guidelines for Public Sector Hazardous Materials Training (Guidelines)*, which identifies requirements for various training audiences. The current edition of the *Guidelines* addresses response and planning training, but does not include guidance for public sector employees with prevention responsibilities. In the next year and a half, the HMEP grantee community and author team will prepare guidance for prevention training that will be included in the 1998 edition of the *Guidelines*.

On January 25-27, 1997, the prevention curriculum author team met in Gettysburg, PA, to continue work on the project. (A list of participants is presented as Exhibit 1.) During the workshop, the author team conducted the initial steps of a formal methodology designed to identify training requirements for all audiences with a role in hazardous materials prevention. This report summarizes the results of the meeting.

BACKGROUND

Training requirements for the HMEP *Guidelines* project have been defined as a comprehensive list of training objectives for each major competency area in the curriculum. The methodology adopted by the author team to develop these training objectives is depicted in Exhibit 2 and summarized as follows:

1. Identify an extensive list of persons by job title/function who perform work impacting hazardous materials prevention.

2. Analyze this list to identify broad functional areas or groupings of related job titles/functions (competencies).

3. Within each of these broadly defined functional areas, identify subgroups of audiences with significantly similar prevention training requirements (audience categories).

4. Identify job outputs produced by each of these audience groups that have the greatest impact on prevention activities (major accomplishments).

5. Develop a step-by-step list of behaviors that successful performers follow to achieve each of these major accomplishments.

6. Revise these behavior statements into measurable, concrete training objectives that define the training requirements for the various audience groups.

FOCUS GROUP RESULTS

During previous meetings of the prevention author team, draft lists of competency areas and audiences were developed. These lists were refined in Gettysburg through extensive discussion and analysis. The revised groupings formed the basis for subsequent work group processes to identify audience categories and major accomplishments. Behaviors and objectives will be developed during later stages of author team work (see Exhibit 3, Prevention Guidelines Development Schedule).

To establish a framework for subsequent analyses, the author team first discussed the scope of the prevention curriculum. Hazardous materials prevention was defined as a "*proactive attitude, effort, and process for eliminating or reducing the effects of hazardous materials events in advance of occurrence."* Appropriate strategies or goals for hazardous materials prevention and related program activities (tactics) were identified as follows:

Prevention Strategies/Goals

- Improve methods and procedures for storage, transport, handling, and processing of hazardous materials.
- Increase public and community awareness and support of prevention.
- Promote compliance with codes, regulations, and statutes.

Prevention Program Activities/Tactics

- Decreasing the overall use of hazardous materials, and/or increasing the use of safer alternatives
- Establishing, monitoring, and enforcing codes and standards for safe storage, transport, handling, and processing of hazardous materials
- Isolating potential hazardous materials sources
- Developing better containment, security, and early warning systems
- Preparing legislation, regulations, and standards controlling hazardous materials storage, transport, handling, and processing
- Land use planning and zoning (set back regulations, density reduction, relocation, land acquisition, etc.)
- Building/facility construction permits and plans review
- Building/facility codes, inspections, and enforcement
- Structural and engineering approaches
- Transport inspections and enforcement
- Environment and hazard monitoring systems
- Public education (public, community decision makers, private sector)
- Disaster insurance
- Tax incentives/disincentives
- Research
- Business/industry health and safety programs (systems safety review of design for new and existing equipment, systems review for reliability, preventive maintenance procedures, internal or external safety auditing procedures, etc.)

The range of audiences needing training in prevention was broadly defined to include the many different persons who impact, through their normal work, the risks that hazardous materials emergencies will occur and the implementation of related prevention measures. Importantly, this list is recognized to include private sector personnel--production workers, facility managers, technical consultants, and others. However, the focus of HMEP training is solely on aspects of these jobs that are directly related to hazardous materials prevention. The author team also decided that the general public is not an appropriate training audience for the HMEP curriculum, although personnel whose responsibilities include public information are specifically included.

Training requirements were organized into seven broad competency areas, currently envisioned as section headings for the planned *Prevention Guidelines*. In several cases, these classifications were further broken down into subcategories representing groupings of audiences with significantly similar training requirements. The competency areas and audience categories identified by the author team are presented in outline form below:

PLANT/FACILITY OPERATIONS

General Laborers

Functional Managers

CONSULTING/TECHNICAL SUPPORT

COMPLIANCE/ENFORCEMENT (RISK MANAGEMENT)

Inspection

Enforcement

PLANT/PROCESS DESIGN AND ENGINEERING

LEGISLATIVE/POLICY MAKERS

Local Government Officials

State Government Officials

Federal Government Officials

Private Sector Executives (CEOs)

Advocacy Groups

LEGISLATIVE/POLICY AUTHORS

Technical Composers

Technical Researchers (Scientists)

Advocacy Groups

PUBLIC EDUCATION

Community Support Services

Public

For each competency area and/or audience category, the author team then identified lists of related training audiences and major accomplishments. An attempt was also made to capture important concepts or issues that emerged during the discussions. This information is presented on summary worksheets as Exhibit 4.

Throughout this process, the author team recognized the usefulness of viewing training requirements from the perspective of four broad job functions or responsibilities: 1) general awareness of hazardous materials prevention, 2) implementation of hazardous materials prevention programs, 3) compliance with and enforcement of hazardous materials prevention measures, and 4) management of hazardous materials prevention programs. The team will use this conceptual framework in subsequent work processes as an analytical tool to further refine the results developed in Gettysburg.

The team also recognized the importance of researching and referencing related legislation, standards, and other prevention literature in their work. A comprehensive list of these materials will be included in the final *Prevention Guidelines*. Furthermore, the team recommends that prevention training objectives be cross-referenced, when appropriate, to relevant citations in two key documents: OSHA 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*, and EPA 40 CFR Part 68, *Accidental Release Prevention Requirements: Risk Management Programs Under Clean Air Act Section 112(r)(7).*

NEXT STEPS

The information contained in Exhibit 4 clarifies the nature and scope of the hazardous materials prevention training requirement. It will form the basis for subsequent efforts by the author team to refine the categorization structure and to develop detailed training objective statements for each category. The bulk of this work will be completed at the next team meeting, scheduled for February 28-March 2 at the National Emergency Training Center.

In preparation for this meeting, team members will prepare draft behavior statements for each of the major accomplishments identified in Gettysburg. (Individual assignments are summarized in Exhibit 5.) As part of this effort, they will research relevant resource materials and conduct interviews with experts or training audience members, as appropriate. The effort required and approach taken for these writing assignments may vary somewhat, depending and the competency area chosen and the resources available to the individual. Team members should use their best judgement in deciding upon a research strategy for their assignments.

As a flexible guideline, team members should write three to eight behavior statements for each major accomplishment. If desired and appropriate, additional statements can be

written to further explain a single behavior statement (sub-behaviors). All behavior statements should begin with a verb and attempt to capture the essence of exemplary performance in a logical sequence. Team members should bring approximately 20 copies of their work product to the meeting, or provide a master copy for reproduction at EMI.

Four documents have been identified as particularly applicable for those competency areas that have significant private sector involvement (Plant/Facility Operations, Consulting/Technical Support, Compliance/Enforcement (Risk Management), and Plant/Process Design and Engineering). These documents are OSHA 29 CFR 1910.119, EPA 40 CFR Part 68, NFPA 1 *Fire Prevention Code* (1992 Edition), and *Uniform Fire Code Article 80*. Copies of the OSHA and NFPA documents were made available at the meeting; EMI will send copies of the others to team members as soon as possible. Team members should bring to the meeting copies of other reference materials that they believe will be helpful.

The author team recommends that the current methodology (Exhibit 2) be followed through at least the next meeting. The inclusion of several additional members with expertise in specific technical areas or training audience requirements may be beneficial; recommendations will be provided to EMI by individual team members. During the next meeting, mechanisms for incorporating feedback from other agencies and organizations will be considered.

Exhibit 1

PREVENTION CURRICULUM WORK TEAM

Tom Aurnhammer, NM (505)599-1437	Bill Lewis, NETC (301) 447-1009
Jim Craig, PA (717) 364-5457	Paul M. Maniscalco, NJ (201) 467-3175
Gerald F. Dickens, NY (718) 266-4565	Milton Painter, VA (540) 436-3573
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Jennifer Krietz, NETC (301) 447-1585	Lynn A. Steffensen, UT (801) 538-3722

Exhibit 2

PROJECT METHODOLOGY

COMPETENCY	**Examples**
Broad functional area/grouping of related job titles/functions	Plant/Facility Operations Consulting/Technical Support Compliance/Enforcement (Risk Management) Legislative/Policy Makers Public Education

TRAINING AUDIENCE LIST All job titles that need prevention training related to a specific competency	Elected officials Safety Officer Facility manager Inspectors SERC/LEPC members Truck drivers Local Government Officials
TRAINING AUDIENCE CATEGORY Subset of job titles with similar training requirements (May be one or more)	Advocacy Groups Inspection Plant/Facility Functional Managers Community Support Services Compliance With Established Work Procedures
MAJOR ACCOMPLISHMENTS Important work outputs with significant impact on prevention (nouns)	Plant/Facility Prevention Policy Risk/Benefit Analysis Dissemination of Public Information Compliance Audit Identify prevention problems/opportunities
BEHAVIORS/OBJECTIVES Tasks/subtasks that successful performers follow to achieve the major accomplishment (verbs)	Prepare inspection checklist and schedule Assess public information media and channels Gather and interpret technical data

Exhibit 3

PREVENTION GUIDELINES DEVELOPMENT SCHEDULE

January 25-27, 1997	Full author team meeting in Gettysburg, PA. Prepare and distribute prevention work report: competencies, training audience categories, and major accomplishments (Pearson).
Jan. 28-Feb. 27, 1997	Prepare draft behavior statements for major accomplishments in assigned areas (author team members). Distribute copies of EPA 40 Part 68 and Uniform Fire Code Article 80 (EMI).

	Full author team meeting at NETC. At this meeting, the team will: • Define individual behaviors to perform job accomplishments for each training audience category. • Outline recommended training objectives. • Outline training methodology narrative for *Prevention Guidelines*.
Feb. 28-March 2, 1997	
March 3-May, 1997	Small team will write the first working draft of the *Prevention Guidelines* (Kaiser, Pearson, Steffensen).
June, 1997	Full team and grantee review group will review first draft of *Guidelines* and submit written comments.
July-August, 1997	Small team will revise *Prevention Guidelines* and develop second working draft (Kaiser, Pearson, Steffensen).
Sept. 13-14, 1997	Full author team meeting, site to be determined. Team will review and revise the second working draft and prepare formal review draft of *Prevention Guidelines.*
October, 1997	Release of formal review draft of *Prevention Guidelines* for three-month public comment period. Material distributed to all HMEP grantees, all relevant professional associations, and the federal community. Comments due by the end of January, 1998.
February, 1998	Full author team meeting, site and date to be determined. At this meeting, the team will review all comments received and finalize the *Prevention Guidelines*.
April, 1998	Final *Prevention Guidelines* released to HMEP grantees and included in the 1998 edition of *Guidelines for Public Sector Hazardous Materials Training*.

Exhibit 4

COMPETENCY/AUDIENCE CATEGORY ANALYSIS

Competency: PLANT/FACILITY OPERATIONS

Audience Category: GENERAL LABORERS

Audience List: Process Operators, Loaders, Transportation Operators, Construction Personnel, Utility Workers, etc.

Major Accomplishments: Understanding of employer's process safety management plan/EMP work plan; comprehension of established procedures and potential impacts; compliance with established procedures.

Comments/Notes: General Laborers includes all production workers at sites that store, transport, handle, and process hazardous materials. Specific job requirements of General Laborers may vary greatly, depending on the type of plant/facility involved and other factors. However, the same generic prevention requirements apply to all.

Competency: PLANT/FACILITY OPERATIONS

Audience Category: FUNCTIONAL MANAGERS

Audience List: Department Heads, End-use Managers, Industry Managers/Owners, Operational/First Line Supervisors, Trainers of General Laborers

Major Accomplishments: Implementation of company policy; enforcement of work plan (includes policies and procedures); training of General Laborers; exercises/drills focusing on prevention; evaluation of safety procedures; recommendations to improve work plan.

Comments/Notes: Functional Managers include persons who oversee the work of General Laborers. The overall goal of this group is to improve the safety performance of production workers.

Competency: CONSULTING/TECHNICAL SUPPORT

Audience Category: NONE

Audience List: Industrial Hygienists, Safety Officers, Risk Managers, System Specialists/Analysts, Information Managers, Plan Reviewers, Lawyers

Major Accomplishments: Internal/Operations: Policies and procedures; site safety/prevention plans and programs; compliance audits; risk management plan; plan development and review; computer modeling (layout, hazards); safety advocacy (records, statistics). External/Design: Input to design; compliance mandates; hazard analyses; legal concerns; technical support; computer modeling; specifications for design.

Comments/Notes: This group has a two-fold mission: support to internal operations, and support to external design. They have technical knowledge and skills in one or more disciplines related to plant/facility design and engineering. Training will focus on the aspects of their jobs that impact hazardous materials prevention.

Exhibit 4 (Continued)

Competency: COMPLIANCE/ENFORCEMENT (RISK MANAGEMENT)

Audience Category: INSPECTION

Audience List: Inspectors from all related areas: Building Code, Chemical Safety, Labor, Building, Fire, Hazardous Materials, Health, Insurance Industry, etc.

Major Accomplishments: Functions related to code/standard compliance (determines compliance and non-compliance: consultation; approval (permit, license); plan review (site, process); construction assistance; operational permits (total system); periodic inspection.

Comments/Notes: This function is external to operations. The strongest focus is on preparatory activities and progress activities. Accomplishments must be related to improved prevention information. The present disciplines of the audiences cover the accomplishments; training should focus on prevention, strengthening their concept of role in prevention. (Inspection can possibly be consolidated with Enforcement.)

Competency: COMPLIANCE/ENFORCEMENT (RISK MANAGEMENT)

Audience Category: ENFORCEMENT

Audience List: Enforcement personnel: code, law, regulatory, DOT

Major Accomplishments: Process safety checklist providing basic input to: violation notice (30 days); corrective action (72 hours); citation (too bad/right now); audit (enforcement inspections).

Comments/Notes: This function is external to operations. The strongest focus is on progress activities. Accomplishments must be related to improved prevention information. The present disciplines of the audiences cover the accomplishments; training should focus on prevention, strengthening their concept of role in prevention. (Enforcement can possibly be consolidated with Inspection.)

Competency: PLANT/PROCESS DESIGN AND ENGINEERING

Audience Category: NONE

Audience List: Requirements Analysts, Architects, Builders, Facility Managers, Corporate Management, Process Specialists, Engineers, Researchers/Developers, Scientists

Major Accomplishments: Blue prints; designs; systems engineering (processes, controls, safety systems); monitoring of construction; specifications; environmental impact studies; models (dispersion, spatial site relationships, process safety, transportation); technology application (newest innovations); presentations to management/policy/legislative groups (risk, designs, cost/benefit).

Comments/Notes: The group looked at this as a function: initial design and refurbishing, remodeling and retrofitting. Work is not done in isolation.

Exhibit 4 (Continued)

Competency: LEGISLATIVE/POLICY MAKERS

Audience Category: LOCAL GOVERNMENT OFFICIALS

Audience List: Mayor, City Council, Planning and Zoning Commissions and Staff, School Boards, Emergency Managers, Fire Chief, Police Chief, Agency Managers, Other Community Officials

Major Accomplishments: Plans; ordinances; zoning regulations; prevention program oversight; public awareness; resources/budgets; EPRCA/right-to-know; levies, taxes, and fees; interagency coordination. LEPCs: plans review, gathering of Tier II information; training (?).

Comments/Notes: The LEPC was included as a subcategory under Local Government Officials. The group felt that, although this entity impacts policy, its role is quite different--it receives information and the output is slightly different. For instance, LEPCs review specific plans related to hazardous materials; other public officials would not interact at this level.

Competency: LEGISLATIVE/POLICY MAKERS

Audience Category: STATE GOVERNMENT OFFICIALS

Audience List: Governor, Legislators, Emergency Management, Agency/Department Managers, Other Officials

Major Accomplishments: Enabling legislation; program oversight; ensuring compliance; empowerment of others (e.g., emergency management); creation of commissions and task forces; taxes, fees, and assessments. SERCs: plans review for completion; management of training.

Comments/Notes: SERCs were included as a subgroup of State Government Officials because of their different roles and outputs.

Competency: LEGISLATIVE/POLICY MAKERS

Audience Category: FEDERAL GOVERNMENT OFFICIALS

Audience List: Agency Managers, Program Managers, Legislators, Regulation Writers, Program Staff, Technical Support, Other Officials

Major Accomplishments: Enabling legislation; budgets; program oversight; taxes and fees; guidance for planning, training, and prevention.

Comments/Notes: The major accomplishments are listed in order of priority.

Exhibit 4 (Continued)

Competency: LEGISLATIVE/POLICY MAKERS

Audience Category: PRIVATE SECTOR EXECUTIVES (CEOs)

Audience List: Business/Industry Owners, Business/Industry Managers

Major Accomplishments: Plant/facility policy; economic development.

Comments/Notes: Plant/facility policy affects public policy and trickles down to General Laborers, Functional Managers, and others.

Competency: LEGISLATIVE/POLICY MAKERS

Audience Category: ADVOCACY GROUPS

Audience List: Union Leadership, Political Action Groups, Lobbyists

Major Accomplishments: Influence on local, state, and federal officials; influence on policy.

Comments/Notes: The group felt that advocacy covers a broad area, so the above groups were included in a single category. Note: Advocacy Groups are also listed as a audience category under Legislative/Policy Authors.

Competency: LEGISLATIVE/POLICY AUTHORS

Audience Category: TECHNICAL COMPOSERS

Audience List: Policy Designers, Regulation Writers, Policy Developers

Major Accomplishments: Development of criteria; measurement of impact of criteria; evaluation and validation of technical data/research; writing of policy.

Comments/Notes: Audience titles were identified as functions, that are often interrelated. For example, Regulation Writers could be considered as Policy Designers.

Competency: LEGISLATIVE/POLICY AUTHORS

Audience Category: ADVOCACY GROUPS

Audience List: Political Action Groups, Lobbyists

Major Accomplishments: Influence on enactment of policy.

Comments/Notes: Note: Advocacy Groups are also listed as a audience category under Legislative/Policy Authors.

Exhibit 4 (Continued)

Competency: LEGISLATIVE/POLICY AUTHORS

Audience Category: TECHNICAL RESEARCHERS (SCIENTISTS)

Audience List: Scientists

Major Accomplishments: Gather technical data; Evaluate technical data; identify hazardous materials prevention shortfalls; recommend prevention measures based on research (could be research based on problem presented)

Comments/Notes: Category was "Scientists" originally. The new name better reflects behaviors the group was addressing.

Competency: PUBLIC EDUCATION

Audience Category: COMMUNITY SUPPORT SERVICES

Audience List: U-Stores, Real Estate Sales, Real Estate Property Managers and Representatives, Retailers, Communication Specialists, Hospitals, Disposal Sites, Media Representatives, Insurance Representatives, Political Action Committees, Professional Groups, Bankers/Lenders, Unions

Major Accomplishments: Dissemination of information to the public and customers; programs for education and training of employees; monitoring of policy for compliance; development and interpretation of policy.

Comments/Notes: Goods and services provided by these audiences should be reviewed as part of the Plant/Process Design and Engineering competency area. Local government officials could be considered a part of this category; however, the group felt this audience is best covered under Legislative/Policy Makers.

Competency: PUBLIC EDUCATION

Audience Category: PUBLIC

Audience List: Professional Educators/Trainers, Public Information Officers, Public Safety Agencies; Media Representatives

Major Accomplishments: Development of public information; dissemination of public information; program strategies and procedures; communication strategies and procedures; evaluation of feedback.

Comments/Notes: The goal of this training is to increase the level of public awareness related to hazardous materials prevention. Risk communication is one of the content areas related to the major accomplishments.

Last Updated: February 4, 1997

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HMEP Curriculum Workplan Goals

December 1996
This report is divided into two sections. The first section, entitled "I. Indianapolis HMEP Workshop Report", describes the input that has been received from the HMEP grantees regarding their needs and priorities for curriculum support under the HMEP grant program. It is the intent of the HMEP program to make every effort to address these needs and preferences, as articulated by the grantees.

The second section, entitled "II. Proposed HMEP Curriculum Workplan Goals", describes the goals and objectives of the work projects and initiatives proposed to be conducted under the HMEP curriculum program during the next two years. The proposed curriculum work has been intended to address, as fully as resources will allow, the curriculum needs and support priorities which have been expressed by the grantees.

I. Indianapolis HMEP Workshop Report

At the Hazardous Materials Emergency Preparedness (HMEP) workshop at Indianapolis, Indiana, on April 22-23, 1996, grantees were asked to provide their priorities during and after the workshop for future curriculum support work that might be provided to grantees under the HMEP program. Approximately 90 grantee representatives attended the workshop. The following is a summary of the input provided by the HMEP grantees regarding future curriculum work. For the purposes of this summary, comments and recommendations of the grantees are grouped into seven categories:

(1) general program issues and recommendations;

(2) response training curriculum support

(3) planning training curriculum support

(4) prevention training curriculum support

(5) training program management support

(6) comments on proposed revisions to guidelines

(7) comments on grantee review draft of response course catalog

(1) General Program Issues and Recommendations

- Create an HMEP Internet Site that includes a bulletin board, HMEP program calendar, downloadable versions of the guidelines and catalog, downloadable versions of selected curriculum committee reports, and chat rooms of some sort for grantee information exchange.

- Maintain and regularly update the Guidelines after release of the 1996 edition. Grantees would like annual updates if possible. Put the information on the internet, but also continue to distribute the book in print form. Several areas have been identified, such as hospital based training and other allied audience programs, that should be included in later editions. Specific comments on the current revisions to the guidelines and current distribution plan are listed in category 6 (comments on guidelines) below.

- Continue the technical support for response course assessment, and annually update the catalog. Put the catalog course assessment information on the internet, but also continue to distribute the catalog in print form. Eventually expand the assessment of training to include planning and prevention courses as well as response. Specific current assessment and catalog issues are listed in category 7 (comments on catalog) below.

- Explore ways to more effectively network the state training managers so that they can exchange information regarding courses under development, to better coordinate at the course development stage so that grantees don't concurrently

develop the same courses at the same time. This will lead to better sharing of resources and better cross-state collaboration on the development of courses. The recommendations ranged from internet "chat rooms" to more frequent conferences and workshops with curriculum planning exchange as one of the regular workshop events.

- As a corollary to the above, establish a program to provide additional financial support to grantees for sharing and exchange of courses, so that grantees can more easily share existing training with each other. Funds would cover costs of duplication of course student manuals, instructors guides, and media sets, and should also cover costs of cross-training instructors. Costs would be more than off-set by savings in redundant course development and revisions achieved in the cross-state sharing of existing courses.

- Increase frequency of HMEP workshops to two per year, rather than just one.

- Develop and distribute an HMEP program newsletter .

- Consider bilingual treatment of guidelines, assessments, and internet material.

- Consider helping reduce duplication of effort in incident reporting, and foster better distribution of incident reporting information to users.

(2) Response Training Curriculum Support

- Form a standing committee for technical updates to response training. The committee should review upcoming trends and changes in the field that will impact response training, and should think things through from the perspective of state training. The committee should report regularly to the general grantee body at HMEP workshops and at other times as needed. The committee should be formed of response instructors, state program managers, and responders. The committee should include volunteer representation and a good mix of response disciplines (fire, law enforcement, EMS, etc.). Among other things, this committee should address the following issues:

- changes in OSHA and other regulatory requirements
- changes in response techniques and protocols
- issues impacting standardization of training
- developing techniques and resources for competency and performance testing
- new NFPA requirements
- mass casualty/terrorist incident response and evolving training requirements

- Assist grantees through guidance and sharing of existing courses from other grantees to improve law enforcement training for first responders.

- Determine strategies to assist grantees in their efforts to ensure quality control over private training programs used by responders/LEPCs. Examine feasibility of some sort of certification program or assessment program for private contractors and consultants providing training.

- Develop better guidelines and standards on refresher training

- Assist grantees and the response community to establish a consensus clarification on what constitutes a haz mat team and what are minimum personnel, competency and equipment requirements.

- Support course development and/or materials exchange to make better field training resources for decontamination available to grantees. Develop strategies to foster national standards accepted by all federal agencies and endorsements to certification levels

(3) Planning Training Curriculum Support

- Ensure that new planning guidelines meet all federal criteria and make every possible effort to ensure fit with other agencies' evolving requirements and guidelines for planning. Wherever possible in the guidelines, support efforts to expand the role of LEPC to do all hazards planning.

- Develop and release to the states several model planning courses that address the new curriculum. This effort may include programs to replace or update HM Contingency Planning, may involve combining G311 and the emergency planning

course, and should focus on "grassroots" planning competencies and issues. Some states will prefer to develop their own programs, so a parallel initiative should be undertaken to assess planning courses along with response courses and add the course information to the catalog. New planning curriculum material should also have broad rather than narrow spectrum (including exercises, SOP writing, etc. and should not just focus on narrow local plan development.

- Develop strategies to support grantee outreach on planning (including courses) that will reach both public and private sectors. Provide program support to assist grantees in linking business, industry and public safety people together in planning. Foster the involvement of associations such as the Association of Contingency Planners for establishing integrated contingency planning processes and support programs.

(4) Prevention Training Curriculum Support

- Develop consensus standards for prevention training. Include strategies for states working with different training delivery systems to reach the different audiences involved in prevention.

Guidelines should cover all aspects of prevention including the following:

- definition of prevention, interrelationship with planning and response
- responder understanding of industry prevention programs
- public education
- planner use of industry prevention plans as planning tools
- competencies and training strategies to ensure that all relevant audiences properly consider hazardous materials issues when performing normal job functions

- Ensure that plan for developing prevention guidelines includes proper review and validation by grantees, impacted professional associations, and federal agencies.

(5) Training Program Management Support

- Develop strategies to foster standardization of training program management nationally.

Support training program management for planning and prevention as well as for response. Include such issues as:

- Instructor training, certification and management
- Curriculum management
- Evaluation and quality control
- Financial management and leveraging of resources (Superfund, oil pollution act, etc.)
- Alternative delivery strategies, such as better use of community colleges to deliver training

- Ensure that plan for developing training program management guidelines includes proper review and validation by grantees, impacted professional associations, and federal agencies.

(6) Comments on Proposed Revisions to Guidelines

- Ensure that new planning guidelines address all issues identified in National Review.

- Ensure that terrorism and illicit haz mat guidelines meet all federal criteria and have proper approval for release.

- Ensure that grantees are fully informed of persons within their jurisdictions who are receiving the guidelines directly from the distribution list.

(7) Comments on Grantee Review Draft of Response Course Catalog

- Ensure that grantees and other providers of training have ample opportunity to do "final sign-off" on the catalog information that will be displayed for each of their courses, to be sure that the summaries of the self-assessment information are acceptable to each provider of training.

- Develop a printing and distribution strategy that allows the catalog to be a true "living document" (perhaps in binders, with careful tracking of distribution to be able to regularly send updates to everyone) so that grantees may continue to add courses as they choose.

- Include different editions of those courses where the older editions are still in use. Ensure that different editions are clearly labeled as such.

- Provide a clearly labeled coded number for each assessment, so that so many of the courses with similar or identical titles can be more easily distinguished from one another.

- Ensure that EPA course assessments are completed and included in the catalog.

- Include all available radiological training in the list of assessed courses. Include EMI's radiological series, and if possible the DOE programs as well.

II. Proposed HMEP Curriculum Workplan Goals

Based upon the input received from the grantees at the April, 1996, HMEP grant program workshop in Indianapolis, the following HMEP curriculum program goals have been established. Every effort has been made to accommodate grantee expressed needs and priorities, within the budgetary restraints of the curriculum support program. The specific program goals for fiscal years 1997 and 1998 for HMEP curriculum support work address the following categories of work:

- Curriculum Guidelines
- Course Assessment
- HMEP Internet Site
- Response Technical Training Committee
- Planning Course Development
- Prevention Guidelines Development
- Training Program Management Support

Guidelines for Public Sector Hazardous Materials Training

Maintain and update the Guidelines every two years. Next edition will be released in January, 1997, and will contain all revisions and updates (including the new planning curriculum) as reviewed and approved by grantees in 1996. A subsequent edition will be released in 1998 and will include the new prevention curriculum and updates to response and planning. These next two editions of the Guidelines will be released both in print form and in downloadable files on the internet.

Course Assessment

Continue course assessment technical support. Eventually this program will be expanded with new self-assessment kits and support teams to address courses for planning and prevention, as well as response.

Maintain and frequently update the Catalog of Assessed Courses. Release as a living document in print form and on the internet. The first edition of the catalog, to be released in January, 1997, will include all changes (all additional courses and additional course information) as identified by grantee review in 1996. Eventually the catalog will be expanded to include courses for planning and prevention, as well as response. All editions and updates of the catalog will be released both in print form and in downloadable files on the internet.

HMEP Internet Site

Create and maintain an HMEP internet home page containing HMEP schedules and calendars, HMEP bulletin boards, downloadable curriculum reports, downloadable Guidelines and Catalog of Assessed Courses, and a chat area for HMEP grantees. The internet site will be up and running by April, 1997 (with all components, including all downloadable Guidelines and Catalog files).

Response Training Support

Create and maintain a response training technical committee that will review upcoming trends and changes in haz mat response and identify issues that will impact HMEP grantee training programs. The committee will prepare reports on the issues to be presented to the general grantee body at HMEP workshops. At current budget, the

committee will meet twice yearly and representatives will report to the twice yearly HMEP grant program workshops. Other work of the committee will be performed as funds allow.

Planning

Develop, test, and hand-off to grantees several short model planning courses addressing some of the LEPC-level competencies defined in the new planning curriculum. Grantees and grantee representatives will be involved as course developers, pilot test instructors, and reviewers. Course materials will be designed and packaged for ease of delivery in the field by grantee training systems. Course content, objectives, and activities will focus on LEPC and other local planning training audiences. Training methodology formats and instructor's guide information will be designed to fit the competencies of local instructors. Upon completion, release of the material to the grantees will include copies of course kits and provision of instructor training.

Foster the develop of model courses against new guidelines, with a range of workplan options that could involve individual state training offices, consortiums of grantees, federal training sources and professional associations for content experts, developers, pilot testing, field testing, and instructor training/materials distribution.

Prevention

Develop national consensus guidelines for prevention training. This will involve a complex author team work sequence with close review by grantee representatives during the authoring process between January and October, 1997. The draft of the guidance will be ready for national review, comment and validation by all grantees, by all federal agencies, and by professional associations in October, 1997. The final prevention guidance, validated by national review, will be included in the 1998 edition of the Guidelines. The author team work sequence will follow a traditional curriculum development model and will include identification of the wide range of training audiences involved in prevention by job and function categories, identification of the major prevention-related job accomplishments for each of these training audiences, definition of competencies to be achieved for each of the job accomplishments to ensure that effective prevention measures are performed, and finally, definition of specific and measurable training objectives and guidance to support training programs to achieve those competencies. The author team for this effort will include grantees, prevention experts, educational specialists, and representatives of the variety of training audiences and professions involved in prevention.

Training Program Management

Conduct pilot tests with selected grantees of the model training needs assessment and training plan materials.

Create and maintain a technical support program for better collaboration in training across jurisdictions, including:

- supporting exchange of courses and cross-training of instructors
- facilitating grantee networking on curriculum planning and joint grantee course development efforts

Create and maintain a technical support program to foster exchange of information between grantees regarding standardized response competency testing for operations, incident commander, technician, specialist, EMS levels 1 and 2 competencies.

Last Updated: March 10, 1997

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Planning Curriculum Workplan

Introduction
December 1996
The new edition of the Guidelines for Public Sector Hazardous Materials Training (Guidelines) will be released in hard copy and on the internet in early 1997. This edition will include new planning curriculum guidance that articulates recommended training to promote more effective local planning.

Grantees have asked that planning course materials be made available to address the planning competencies in the new curriculum. This workplan addresses proposed strategies to facilitate the availability of training materials to the grantees for training local and state planning teams and related audiences.

The goal of this program will be to improve local response planning, through supporting more effective HMEP grantee training of the personnel involved in developing, implementing and maintaining hazardous materials response plans. The work strategies to accomplish this goal include definition of specific courses needed, definition of methodology and delivery parameters for those courses, a search and evaluation of available training, course development, modification and adaptation efforts as needed to prepare suitable courses for grantee use, and dissemination of those materials to the grantees.

The primary challenge for this project will be to ensure that well-focused courses are made available to grantees while at the same time collaborating effectively with the many different organizations and programs currently undertaking development of planning courses. Every effort will be made in the upcoming work to assist the training community at large to avoid redundant development efforts and to collaborate with other organizations to ensure that the training needs of the HMEP grantees are properly met.

A second challenge for this project will be to ensure, through extensive HMEP grantee involvement in group pilot testing, review, and revision processes, that all training products produced or made available to grantees reflect the full involvement and consensus endorsement of the HMEP grantee community.

Curriculum Organization and Training Requirements

The curriculum needs are being organized in three training levels: planning orientation, planning essentials, and planning specialties. The focus of the curriculum is the development of skills, knowledge, and attitudes in a large variety of training audiences to promote better local planning.

The orientation training area provides an overview of planning with an emphasis on the need for planning and the benefits to be derived. The training audience is all persons who have a "stake" in planning and all who may impact the release of resources for planning.

The centerpiece of the curriculum is planning essentials, which will be designed to focus on training local personnel to do the job of developing a local response plan. Depth of planning skill development will be limited to those skills needed to produce a basic local plan. The training audience is local planning team members.

Recognizing that there are many skills needed to support the planning process above those skills involved in basic local plan development, the planning specialties level of the curriculum has been organized to articulate those additional, often more advanced specialty training skill areas. These include competencies such as hazard analysis, public education, and commodity flow study development. It is anticipated that state and local training and planning priorities will be such that there will be considerable variance in the need for training selected personnel in any given specialty area. Hence, the program will be designed to support selective focused training by jurisdictions on only those specialty skill areas needing training at any given time. The specialty area topics in the curriculum will be additive over time, and it is anticipated that many more specialty areas will be defined as the needs arise.

Initial Workplan

The planning curriculum author team met at NETC on December 7-8, 1996, and identified the following areas for training as priorities for which course materials should be made available to the grantees for conducting planning training:

- Planning Orientation

- Planning Essentials
- Planning Specialty: Hazard Analysis and Capability/Needs Assessment
- Planning Specialty: Protective Actions
- Planning Specialty: Public Education
- Planning Specialty: Plan Implementation and Maintenance

General training descriptions and objectives for each of these areas are included in the Planning Section of the 1997 edition of the *Guidelines for Public Sector Hazardous Materials Training*. The author team has requested grantee review and prioritization of these training areas at the December HMEP grantee workshop, should resources limit subsequent work on this curriculum to a subset of the above. A possible reduced initial effort would be Orientation, Essentials, and one Specialty training area.

The team will meet on February 24-27, 1996, to refine competencies, objectives, and course requirements for these six training areas, and then will conduct a search for existing, adaptable training to meet each set of requirements. For those areas in which training materials either do not exist or require significant modification to meet the requirements, course development and revision plans will be established.

Course Development/Testing Considerations

For those training areas where new course development or significant revisions of existing courses will be needed, the author team has identified a number of course development and pilot testing approaches to ensure that the resulting programs will have maximum utility to grantees. The details of these approaches will be provided in subsequent course specific workplans. The underlying strategies are:

1. to conduct multiple pilots with alternating author teams to control for author dependency;

2. to conduct sufficient field tests with progressive involvement of local instructors to ensure that the instructor material is sufficiently clear to support local decentralized delivery by grantees;

3. to provide in-depth instructor background information on critiquing diverse student responses to activities and exercises, to minimize quality control challenges for grantees;

4. to provide instructionally self-contained modules whenever possible to assist grantees in tailoring instruction to local needs;

5. to provide multiple tracks and alternative activities/exercises to accommodate local differences in planning hazards and issues, again to assist grantees in tailoring the programs to local needs; and

6. to provide course-specific training program management aids and tools to further assist grantees in the curriculum management and course delivery decisions necessary for tailoring programs to local needs within their jurisdictions.

Planning Curriculum Development Work Sequence

The following is the current work sequence for making planning courses available to the HMEP grantees .

January, 1997 Begin compiling information on existing planning courses, and those programs currently underdevelopment by state, federal, and professional association providers of training.

February 24-27,1997 Full author team meeting at NETC, Emmitsburg, Md. At this meeting, the team will:
1. finalize training objectives and competency requirements for each of the competency categories in the planning curriculum
2. develop specific course design documents for needed training programs
3. develop assessment tools for reviewing existing courses

To be determined Full author team meeting to identify adaptation of existing courses and development of new courses as needed
1. Conduct a review of relevant existing courses and proposed course development efforts, to determine suitable programs for adaptation to meet curriculum requirements.
2. Develop a revised workplan, indicating specific courses to be developed, specific courses to be adapted, specific development efforts from other programs to be supported and assisted.

To be determined For each course to be developed, there will be a unique series of course authoring meetings, pilots, revisions and hand-off schedules.

To be determined For courses to be adapted, there will be a unique series of pilot and revision meetings, and hand-off schedules.

6. Planning Curriculum Workteam

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Planning Orientation

Scope/Objectives of Training:

Training should provide an overview of planning, with an emphasis on the need for planning and benefits to be derived. No skill development should be attempted. Objectives should result in a positive attitudinal change in terms of understanding the need for planning and achievement of a general understanding of the community planning function.

Audience:

Training audience is all persons who have a 'stake' in the results of planning and all persons who may impact the release of resources for planning. Audience includes:

Local officials, including elected and appointed
LEPC/SERC members
Facility managers
Emergency responders
General public
Special interest groups
Emergency program managers
Trainers who may be teaching this course

Prerequisites or presumed prior knowledge/skills of students:

None. Note that this includes many students who will have no prior understanding at all of existing response systems, such as fire department operations, and/or no prior understanding of the issues or challenges associated with interdepartmental coordination such as is needed in community planning.

Typical Program Format

Short seminar-type instructor-led program, 2-4 hours in length.

Methodology and Training Delivery Considerations:

- Training should be short (2-4 hours in length).

- Training should be high interest, with dynamic media considerations.

- Audience should be heterogeneous, reflecting diverse community members and professional disciplines who should be involved in the planning process.

- Course methodology should emphasize group interactions and initial team building.

- All training experience should be positive, to promote attitudinal change. Crispy critter disaster threats, important to focus attention on need, should be clearly accompanied with positive solutions through community planning in the course preparations.

- Course materials should be heavily 'peppered' with local examples and issues, to help generate real interest in local planning.

- Recruitment of students is a major training issue for the program, because of lack of pre-

existing interest in the subject. Possible need for 'teaser' programs and strategies to peak community interest and enrollment.

Planning Essentials

Scope/Objectives of Training:

Training should provide skill development in developing local community response plans. Depth of planning skill development is limited to those skills needed to produce a 'basic' local plan in a team planning format.

Audience:

Training audience is persons who have a responsibility as local planning team members to develop local community response plans.

Prerequisites or presumed prior knowledge/skills of students:

Planning Orientation competencies and the general expertise in the professional discipline that the student represents on the planning committee. No prior skill development or experience in planning beyond the Orientation Training Program, or equivalent.

Typical Program Format

Two to four days of classroom instruction, with extensive group activity work on developing plans.

Methodology and Training Delivery Considerations:

- Training should be approximately 2-4 days in length. Breaking the training into modules delivered at different times if possible, but continuity of team building is very important so it is recommended that the student groupings be maintained throughout the training.

- Training should focus on the actual development of a local plan, with the plan product and full participation in the group planning process used to demonstrate student mastery of the objectives.

- Audience should be heterogeneous, reflecting diverse community members and professional disciplines who should be involved in the planning process. It is highly recommended that the community team members who will work together in subsequent local planning be trained together as a team.

- Course methodology should emphasize group interactions, team building and resolution of team conflicts as well as the development of the plan product itself.

- Course materials should be multi-tracked in terms of type of plan, such as OSHA, SARA, etc.), to allow tailoring the instructions to the highest need of the local student planning group.

- Instruction should include practical local strategies for merging local plan requirements and needs (i.e. merging several plan requirements into one effort) to foster more efficient local planning efforts.

- Instruction should emphasize the need for on-going planning commitments by the team and the organizations they represent.

- Instruction should also emphasize the need for ongoing evaluation at each step in the planning process.

- Instructors should emphasize that the steps in the planning process, although taught sequentially, may actually be performed simultaneously.

Planning Specialties
PROTECTIVE ACTIONS

Scope/Objectives of Training:
The training should provide a working knowledge on the benefits and limitations of various protection strategies including evacuation, in-place protection, or a combination thereof. The participants will gain an understanding of the need for planning, important

planning considerations, understand and be able to implement a decision-making process to implement any given protective action, and have an understanding of the ways and means to communicate the desired protection action to the general public to get the best possible positive response actions.

Audience:
Planners
Incident Commanders
Elected Officials
Public Information Officers
Warning Officers
Local Emergency Planning Committee's
Emergency Management Officials

Prerequisites or presumed knowledge/skills of students:
Students should be in a position to contribute to the community emergency planning process. They should have mastered basic skills, understand the concepts of the Incident Command System, and have basic community relation skills or training.

Typical Program Format:
An instructor facilitated 2 day (16 hour) program with lecture/discussion, workshop or tabletop exercises, and case study reviews.

Methodology and Training Delivery Considerations:
-Training must emphasize the inter-relationship between the planning process, the response actions, and requirement for public education components.

-Course methodology should emphasize small group interactions between the various levels of interest. Several case examples should be incorporated into the course materials.

-Workshops or tabletop exercises should be used to promote and evaluate the skill/learning objectives.

-An instructional cadre concept should be used.

Planning Specialties
HAZARD ANALYSIS AND CAPABILITY AND NEEDS ASSESSMENT

Scope/Objectives of Training
The tasks of analyzing hazards include (1) identifying hazards associated with facility and transportation conditions within a jurisdiction, (2) conducting a vulnerability analysis to determine what in a community is susceptible to damage should a hazardous materials release occur, and (3) conducting a risk analysis to determine the likelihood of emergencies occurring and the likelihood of damage to a community from potential hazardous materials releases.

Training should provide an overview of the hazards analysis process, with an emphasis on the need for conducting hazards analysis and the benefits to be derived from conducting hazards analysis. Skill development should include the ability to utilize the tables for determining the level of concern for establishing hazard and vulnerability zones. Objectives should result in a positive attitudinal change in terms of understanding the need for hazards analysis and in achievement of a general understanding of hazards analysis as a component of the overall planning function.

Audience
Potential training audiences include:

- participants in the planing process
- LEPC/SERC members
- facility managers
- prevention personnel
- city/community officials
- general planners

Prerequisites or presumed prior knowledge/skills of students
None. Note that this specialty course includes many students who will have no prior understanding at all of the hazards analysis process. Consideration should be given to those students that have a basic responsibility for conducting hazards analysis as a part of their job.

Typical program format
Seminar-type instructor-led program, approximately 6 to 8 hours in length.

Methodology and training delivery considerations
Training should be focused on developing knowledge of the steps and components of hazards analysis and on developing skill in performing hazard identification, vulnerability analysis, and risk analysis. Trainees need to understand the significance and application of information to develop the ability to recognize and develop useful and meaningful data on which to base subsequent planing and prevention programmatic and organizational decisions.

Most of the content for analyzing hazards can be introduced through self-study, but the overall training should include formal classroom instruction with a large percentage of the time in individual and small group work. Activities should focus on skill development in extracting hazard identification and vulnerability data from provided data sources, determining vulnerable zones from community maps and hazard data, and performing the analyses leading to correct risk determination. Content testing is appropriate in demonstrating knowledge of the steps involved in hazards analysis, listing types of hazard information, and identifying the components of the completed hazards analysis. Integration of the information learned by the trainee can be demonstrated in a post class activity of developing a limited jurisdiction complete hazards analysis using data from the trainee's home jurisdiction.

Because of the interdisciplinary nature of team planning, training audiences should be heterogeneous and, whenever possible, small-group work should be conducted so that cross-discipline interactions are encouraged.

Planning Specialties
PUBLIC EDUCATION

Chemical/Radiological/Biological/Nuclear/ Hazards Awareness Talks:
CHAT/RHAT/BHAT/NHAT

Scope:
Training in hazardous materials public education with an emphasis on implementation. No skill development is anticipated. Positive attitudinal change in terms of understanding the need for community awareness.

Benefits to the public to be derived from awareness is: assistance to responders; knowledge of what to do in a given situation; positive awareness of response capabilities within the community; identification of concerns requiring further attention

Audience:
Public safety educators; LEPCs

Prerequisites:
None. Recommended- Orientation Course. The provider will have skills in the following areas or to be able to provide the following elements: an overview of hazardous materials within communities; an overview of the Emergency Planning and Community Right to Know Act; an overview of recognition and response ; an overview of MSDS information and sources of information, etc.

Knowledge/Skills:
Two potential audiences: One with knowledge of Haz Mat but not necessarily public education; one with public education background, but not necessarily Haz Mat; facilitator trained.

Typical Program Format:
Video; overhead, 35 mm slides; 1-2 days (for instructors); 1-2 hours for the public or as need is expressed by the customer.

Methodology:
High interest- with dynamic media considerations; interactive lecture with audience participation; exercises/ role playing; local examples as available; technical resources and examples; how to access information; materials available from EPA/DOT/FEMA/NIEHS etc.; packaged in alternative delivery method- CD ROM; slide/synch show; video; facilitation.

Planning Specialties:
Notes: SEE PUBLIC EDUCATION PLANNING SPECIALTIES:
Prev 6.4-- presenter needs/job task
Prev 6.5-- presenter needs/job task

Prev 6.7-- presenter needs/job task (lightly addressed for public audience)
Prev 6.10 through PREV 7-- These are outcomes.

NOTE: Word smithing terminal and enabling objectives is suggested. Word smith terminal and enabling items as listed.

Planning Specialties
PLAN IMPLEMENTATION AND MAINTENANCE

Scope/Objective of Training:
Training should provide students with the knowledge, skills, and practical tools needed to successfully implement a completed hazardous materials response plan, anticipate future outcomes, monitor and evaluate the plan's effectiveness, and revise it as appropriate to improve the community's response capability. The instruction should build on the Planning Essentials course to help students develop the "feedback loop" necessary for long-term plan maintenance and enhancement.

Audience:
The training audience includes all personnel involved in implementation, validation, and maintenance of a completed hazardous materials response plan for their respective agencies and organizations. Audience members potentially include planners and decision makers for all agencies and organizations represented in the plan, community leaders, and others interested in improving hazardous materials preparedness. Ideally, planning teams from local jurisdictions will take the course together.

Prerequisites or Presumed Prior Knowledge/Skills of Students:
Planning Orientation and Planning Essentials competencies and previous experience as a local planning committee member. Students should have a firm grasp on planning fundamentals and also have job skills and responsibilities directly relating to organizational planning.

Typical Program Format:
One to two days of classroom instruction with a heavy emphasis on activities designed to help students develop strategies and mechanisms to assess, evaluate, and refine existing hazardous materials response plans. Job aids to facilitate later work may be desirable.

Content of the course should address validation of the completed plan, to include methods of plan review, plan testing, and exercising, and plan maintenance, to include development of a remedial action process to identify, illuminate, and correct problems with the plan. Other potential subject areas include development of evaluation criteria early in the plan development process, environmental scanning, management audits, performance audits, and integrating the results with other planning processes.

Methodology and Training Delivery Considerations:
-Where possible, training should be developed as stand-alone modules that can be used flexibly by jurisdictions depending on their specific needs.
-The audience will be heterogeneous, reflecting the wide range of experienced personnel involved in the local emergency plan development process. If possible, community team members who work together as a planning team should be trained together as a team.
-Course methodology should emphasize small group interactions and practical activities based on actual community plans and situations. Since teamwork and continuity are very important in plan implementation and maintenance, it is recommended that student groupings and interaction be maintained throughout the training.
-Case studies or scenarios should be available for use with training audiences from diverse communities and organizations. Instructor should be able to flexibly tailor, update, or substitute these materials, depending on audience needs.
-The course will emphasize skills and attitudes needed for students to become effective long-term community change agents. Emphasis will be placed on methods and techniques for effecting change.

Last Updated: March 10, 1997

HMEP
- Background
- Calendar
- Federal Grant Programs
- Training Curriculum Guidelines
- Curriculum Working Reports
- Federal Contacts
- Grantee Contacts
- Hazmat Links

Hazmat Guide

HMEP Coordinated Grant Assistance Workshop

December 11-12, 1996
Response Training Committee Reports
HMEP Grant Program

Response Training Committee Overview
1. Purpose of the Committee

The primary purpose of the committee is to give HMEP grantees advance warning of future challenges in haz mat response training so that grantees can better prepare to meet those challenges. This includes alerts on upcoming regulatory and standards changes, identification and analysis of future trends and developments in haz mat response that will impact training, and assessment of possible solutions and strategies that grantees might undertake to meet upcoming challenges. This advance information will usually be provided to grantees in the form of reports at the semi-annual HMEP grantee conferences.

A second purpose of the committee will be to determine appropriate changes to the HMEP curriculum guidelines and to provide oversight to the revisions to the response training section of subsequent editions of the Guidelines for Public Sector Hazardous Materials Training.

A third purpose of the committee will be to actively assist grantees in meeting the anticipated challenges. This will depend on need and availability of resources and may include (1) providing to the HMEP grantees products and tools (such as training materials or seminar instruction) on upcoming issues, (2) establishing communication channels for grantee input regarding regulatory and standards changes (such as better input links between HMEP grantees and NFPA committee work), and (3) representation at national levels on other related commitees for specific issues impacting state and local hazardous materials training.

2. Possible Products of the Committee in Service to HMEP Grantees

Products of the committee will include:

(1) periodic issue and topic reports to the HMEP grantees;

(2) decisions on new material to be added to the guidelines; and

(3) special project products as needed, to be determined in the future based upon funds available and need.

3. General Trends

In the first two meetings, the committee projected a number of trends in the field of emergency response that were anticipated to have direct impact on hazardous materials response. These trends will have pervasive ramifications for hazardous materials training over the coming years.

- continued reduced public sector funding and ever tightening budgets in the future
- increasing public expectations for comprehensive and error-free 911 handling of hazardous materials incidents, stemming from increased public awareness
- increases in responder mission stemming from reduced support from other public agencies also feeling budget reductions (such as managing post-emergency spill clean-up in absence of other public sector functions at the scene)
- increases in responder mission stemming from industry changes (ex: relaxed industry environmental requirements and voluntary self-regulation means less large industry incidents using industry response but more "mom and pop" incidents using 911 response)
- increases in responder mission with extra competency requirements stemming from evolving issues such as increased sick building syndrome from new construction techniques, etc.
- ever changing requirements stemming from OSHA, NFPA, collateral standards, etc.
- need to revisit use of expensive teams for routine offensive operations, to save costs, and thereby impacting existing 1st responder competency requirements

4. Specific Priority Topics for Briefing Grantees

In the first two meetings, the committee identified the a number of topics and issues which were anticipated to have immediate or upcoming impact on hazardous materials training. The committee felt these topics merited immediate briefing of the grantees, and were prepared for the December 11-12, 1996 HMEP grantee workshop.

- Terrorism and Illicit Use of Hazardous Materials: 1st Responder Training Issues & Ramifications
- Expansion of 1st Responder Responsibilities for Incident Spill Clean-Up
- Enhanced Operations Procedures: OSHA quips on Spill Clean-Up
    - DOT Guidebook Changes: Rationale and Training Ramifications
- OSHA and Other Regulatory Changes
- Alternative Fuels
- Carbon Monoxide Response
- Sick Building Syndrome Response: Hazardous Materials Training Issues
- Use of Overhead Teams in Haz Mat Response
- Guidelines for Improving LEPC Exercises
- Techniques to Improve Scenario Training for Haz Mat Courses
- Upcoming Changes to NFPA 471, 472, 473
- Improving HMEP Grantee Input into NFPA Rulemaking Processes

5. Committee Membership

Jerry Clark, New York State Fire Prevention and Control (518) 474-6746

John Eversol, Chicago Fire Department (312) 747-6582

Steve Foley, NFPA (617) 984-7468

Rich Gaun, Vermont Dept of Health (802) 863-7310

Ron Hargrave, Virginia Dept of Emergency Services (804) 674-2510

Steve Hausotter, Tualin Valley FD, Oregon (503) 625-2065

Bill Lewis, FEMA EMI (301) 447-1009

Steve Maslansky, Private Industry, Arizona (520) 776-9680

Steve Patrick, VA Dept of Emergency Services 703/ 491-7044

Sgt. Robert Pinero, Louisana (504) 878-6710

Steve Storement, Phoenix Fire Department (602) 256-3159

Jerry Wheeler, Michigan State Police (517) 322-1942

OSHA representative

Terrorism and Illicit Use of Hazardous Materials: First Responder Training Issues and Ramifications

Introduction:

Terrorism is defined as the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, religious, or social objectives. Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of the United States government or population without foreign direction. International terrorism involves terrorist activities committed by groups or individuals who are foreign-based and/or directed by countries or groups outside the United States or whose activities transcend national boundaries.

The illegal storage, transportation and disposal of hazardous materials and wastes poses a great risk to public sector responders. Historically, incidents involving hazardous materials and hazardous wastes have threatened public health and the environment resulting in efforts to enhance control of these materials. Federal state and local governments have

adopted standards and legislation in an attempt to reduce the risks to the public and the environment. The controls adopted have increased the complexities and costs of storage, transportation and disposal of these materials.

Federal Bureau of Investigation (FBI) statistics report a total of 110 terrorist incidents that occurred in the United States between the years 1983 and 1991. The February 20, 1993, bombing of the World Trade Center in New York City and the April 19, 1995, bombing of the Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma illustrates that terrorism can occur any where within the United States. On March 20, 1995, the nerve agent sarin was released into the Tokyo, Japan subway system reportedly by a Japanese cult. This terrorist incident resulted in 12 fatalities and at least 5,510 injuries. One hundred thirty-five of the responders were injured after direct and indirect exposure to the nerve agent. Within the United States, incidents involving biological agents have been documented in major metropolitan areas as well as rural locations. These incidents have occurred on both the east and west coasts as well as central parts of the United States.

The increase in terrorist attacks and the uncovering of buried weapons on military and urban neighborhoods have caused the emergency response agencies to review their preparedness to mitigate such hazards. Terrorism and unknown chemicals at military depots pose the greatest threat to civilian exposure. Few response agencies have the training, education, or equipment to mitigate these hazards. Since most of these agents are not in commerce, information is difficult to obtain. This makes the selection of proper personal protection equipment (PPE) very difficult. Terrorist attacks, such as the World Trade Center, Oklahoma City, and the Tokyo subway, demonstrate the need for appropriate training, community preparedness, and planning as well as specialized detection equipment and personal protective clothing.

Statement of the Problem:

Intentional releases of hazardous materials due to acts of terrorism or other criminal activities pose a unique challenge to public sector responders who respond to hazardous materials emergencies. Such intentional releases include, but are not limited to, illegal manufacture of drugs, improper disposal of hazardous materials and wastes, improvised explosive devices, manufacture and release of chemical agents and toxins, culture and dissemination of biological agents. Emergencies involving these types of releases may occur during illicit manufacture, storage, transportation, disposal, or intentional releases.

Separate training covering public sector response to environmental crimes and the consequences of terrorism may not be available to all responders nationwide. Another problem is that separate training on these subject areas may consume time and resources out of proportion to the magnitude of the local risk. Fortunately, hazardous materials utilized in terrorist incidents and environmental crimes generally present hazards consistent with at least one of the Department of Transportation (DOT) hazard classes.

Traditionally public sector responders have been trained to identify hazardous materials based on outward warning signs and detection clues. Clues such as occupancy location, container shapes, markings, and colors may not be consistent with traditional hazardous materials training. Consequently, rapid identification of the materials and type of problem may be difficult. Also nuclear training for first responders has traditionally been for major catastrophes (i.e., nuclear war and power plant meltdown), and not for small isolated terrorist devices.

Harm associated with illegal activity involving hazardous materials can effect numerous people and occur in unique locations. Public sector responders may be a risk due to lack of warning, secondary releases targeted at responders, and the potential for a mass causality chemical incident. These types of incidents are criminal acts and will involve law enforcement response from various levels of government as well as specialized teams.

Recommended Solutions:

Grantees should examine all facets of their response system to ensure preparedness for response to incidents of terrorism and illicit use of hazardous materials. This review should include existing plans, operating procedures, equipment, training, and exercises.

Plans should address:

- consisentancy and interface with plans from all levels of government, specifically the Federal Response Plan.
- Presidential Decision Directive 39, specifically examining responsibility for crisis management and consequence management in their community.

- unified command operations with all levels of government.
- mass casualty chemical incidents

Operating procedures should address:

- command post operations including command post security, responder accountability and on-site responder identification.

- protection against secondary explosive devices.
- crime scene operations, evidence collection and chain of custody.
- emergency decontamination and mass casualty chemical incidents.

Equipment should be evaluated to ensure appropriate protection and detection of Nuclear Chemical and Biological Agents (NBC).

Existing training courses for all responders should be enhanced to include competencies for response to incidents involving the illicit use of hazardous materials. Annual refresher courses should address these competencies to ensure appropriate training availability for currently certified first responders. Locally identified needs may require stand-alone training programs for some response agencies.

Agencies should identify persons as their point of contact for issues regarding terrorism and the illicit use of hazardous materials. These persons should interface with appropriate response agencies to include EMS, fire, hazmat, and law enforcement.

Efforts are underway nationally to develop training standards for all competency levels consistent with NFPA and OSHA. The response committee will continue to track development of these standards and make available to the grantee.

Expansion of First Responder Responsibilities for Incident Spill Clean-Up

Statement of the Problem:

First Responders that are trained in emergency response under the Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation are generally trained to the First Responder Awareness and First Responder Operations levels, but are not trained to do clean-up of hazardous materials and hazardous wastes.

The clean up of hazardous materials, and hazardous wastes, requires additional training and compliance with a variety of OSHA and EPA regulations that are outside the scope of the emergency response section of HAZWOPER.

When clean-up (treatment or containment) of hazardous materials and hazardous wastes is required while the emergency operations are still being conducted, the Federal On-Scene Coordinator (FOSC) has the authority to waive compliance with Resource Conservation and Recovery Act (RCRA) requirements. However, once the emergency operations phase has ended, even the FOSC must comply with the requirements of RCRA.

For small spills of gasoline, diesel fuel, motor oil, brake fluid, transmission fluid, and radiator fluid associated with motor vehicle accidents, first responders DO have the ability to do minor cleanup of these spilled fluids as long as the disposal is handled properly. The acceptable methodology is to handle this type of incident as household hazardous waste by treating the motor vehicle as an extension of the household.

Recommended Solution:

Grantees that wish to have their first responders do minor spill cleanup as a result of motor vehicle accidents should do the following:

A. Determine if the EPA in your area treats motor vehicles as an extension of the household. If the answer is yes, ensure that liquids spilled from the motor vehicle are treated as household hazardous waste.

B. Develop a SOP that outlines the procedures to be followed by your operations level personnel that includes:

1. The title of the SOP

2. The scope of the SOP

3. The PPE required for conducting the spill clean-up operation.

4. The actual procedure to be followed when engaging in the spill clean-up operation, including:

a. the type of absorbent to be used for each type of fluid spilled

b. recommending the placement of the absorbed materials into double layered plastic trash bags of 6 mil thickness

c. placing the bags of absorbed materials into the trunk of the motor vehicle

d. advising the motor vehicle owner to dispose of the absorbed materials in the household trash as household hazardous waste

5. The training required prior to allowing personnel to engage in the offensive operation, with emphasis on the proper PPE and NOT exceeding the scope of the SOP

Enhanced Operations Procedures: OSHA quips on Offensive Operations

Statement of the Problem:

First Responders that are trained in emergency response under the Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation are generally trained to the First Responder Awareness and First Responder Operations levels, but are not generally trained to the Technician level. As a result, First Responders are limited to engaging in only defensive operations and are legally prevented from approaching the release to plug, patch or otherwise stop the release.

For decades first responders such as firefighters and public works personnel routinely plugged leaks in containers such as automobile fuel tanks, truck saddle tanks, and leaks in residential natural gas lines. However, the HAZWOPER regulation precluded first responders from continuing to perform these tasks.

To facilitate the ability to engage in this type of offensive work many agencies have written standard operating procedures (SOP) that provide guidelines for conducting these procedures. They submit the SOP to the Occupational Safety and Health Administration (OSHA) that has jurisdiction and, in most cases, find that OSHA will approve the SOP. Once the SOP is approved by OSHA, the actions are considered acceptable by operations level personnel as long as the scope of the SOP is not violated.

Recommended Solution:

For grantees that desire to have their operations level personnel engage in offensive operations they need to:

A. Develop a separate Standard Operating Procedure for each offensive operation, such as plugging vehicle fuel tank leaks, plugging saddle tank leaks, plugging natural gas line leaks. The content of each SOP should be, at a minimum:

1. The title of the SOP

2. The scope of the SOP

3. The PPE required for conducting the offensive operation.

4. The actual procedure to be followed when engaging in the offensive operation

5. The training required prior to allowing personnel to engage in the offensive operation, with emphasis on the proper PPE and NOT exceeding the scope of the SOP

B. Submit the SOP to your OSHA representative for approval

C. Following approval of the SOP by your OSHA representative, train your personnel as defined in the SOP

D. Don't allow your trained personnel, in actual field operations, to exceed the scope as defined in the SOP

By addressing these simple steps, the capabilities of your first responder operations level personnel can be greatly enhanced and your dependence on Technician level personnel will be reduced for these routine type of incidents.

Quips:

Operations Level Firefighters.

29 CFR 1910.120(q)(6)(ii)

May an emergency responder trained only at the operations level under paragraph (q)(6)(ii) of the standard perform aggressive or offensive actions at an emergency involving a small spill or leak of gasoline without the employer being in violation of the Standard? Typical actions would include plugging or patching a leaking automobile gas tank.

Operations level training by itself is designed to enable emergency responders to safely perform defensive action at a safe distance from the point of release; personnel who have not been trained beyond the operations level are not considered adequately trained to take aggressive action at the point of release and are not permitted to do so. Such action would be in violation of 29 CFR 1910.120(q)(6)(iii), which defines the training requirements for personnel designated to take aggressive action (i.e., hazmat techs).

However, "a small spill or leak of gasoline" would not necessarily constitute an emergency or potential emergency covered under the HAZWOPER standard. Firefighters with or without operations level training may be permitted to handle non-emergency releases of an identified hazardous substance which they are adequately trained and equipped to control. Where an emergency or potential emergency release has occurred, personnel who have not been trained beyond the operations level may perform defensive action, only, deferring aggressive action to more highly trained personnel.

De Minimis Training Policy for Firefighters.

29 CFR 1910.120(q)(6)(iii)

29 CFR 1910.120 is a performance based regulation, providing some flexibility to the employer in meeting the requirements of the regulation. With regard to training, paragraph (q)(6) states " training shall be based on the duties and function to be performed by each responder;" all employees must be adequately trained to perform their assigned job duties without danger to themselves or others.

Hazardous materials technician (hazmat tech) training is necessary for emergency responders who take aggressive action in a potentially dangerous area to stop the release. OSHA may, in appropriate circumstances, consider violations of hazmat tech training to be "de minimis," however, when they do not impact on the ability of responders to safely perform their assigned job duties. The burden would be on the employer to demonstrate to OSHA that the violation did not pose a hazard to the safety or health of employees and that the violation was in fact de minimis in nature.

Therefore, in certain limited circumstances, personnel who do not meet all of the training requirements for the hazmat tech level, but who have training beyond the first responder operations level, would be considered by OSHA to be adequately trained to perform a specific task not otherwise permitted for operations level personnel.

The September 20, 1991 letter addressed to Ron Runge to which you refer was intended to apply only to firefighters. OSHA considers properly trained firefighters to already have extensive training and experience in handling gasoline or other fuel incidents by nature of their regular job duties. However, where the identity of the hazardous substance involved in an uncontrolled release cannot be determined, or where the hazardous substance is one for which firefighters have not received specific training or do not have adequate control equipment, aggressive action should be deferred to a fully trained HAZMAT team. Further, response by a fully trained HAZMAT team may be necessary whenever there are factors which may complicate response efforts.

Consideration for the de minimis policy for 29 CFR 1910.120(q)(6)(iii) is generally limited to small scale emergency involving limited quantities of a known hazardous substance which firefighters are adequately trained and equipped to handle.

Roles and Duties, Hazard Assessment, and Firefighters.

29 CFR 1910.120(q)(2)(ii) and (q)(6)(iii)

You state that the HAZMAT team in one of your urban counties has adopted the policy that gasoline spills of 25 gallons or less do not require response by a HAZMAT team, and can be safely handled by firefighters with "operations plus" training.

OSHA has no authority to determine how State and local authorities divide responsibilities between their fire departments and HAZMAT teams, and express no view on that issue. However, if fire department members with inadequate HAZWOPER training take too aggressive action to respond to a hazardous substance emergency, a violation of 29 CFR 1910.120(q)(6)(iii) would exist; this would not be the case is the fully trained and equipped HAZMAT team were to respond. OSHA does acknowledge that in many cases firefighters may have the capabilities to safely respond to spills where fewer than 25 gallons of gasoline are involved without full hazmat tech training provided they have extensive training in the safe handling of gasoline.

However, the hazard assessment of which incidents can be safely handled by responders without full hazmat tech training cannot be based on quantity alone. Ambient conditions and specific hazards at the scene must be included in the hazard assessment. Which incidents can be safely handled by responders who do not meet all of the competencies required for hazmat tech level would depend also on the extent and content of the additional training beyond the operations level which they had received.

Employers must establish in their written emergency response plan, required in paragraph (q)(2)(ii), guidelines for determining in which scenarios aggressive action should be deferred to the fully trained HAZMAT team. Personnel who will be expected to take aggressive action, but who have not been assigned the full duties of the hazmat tech level, should as part of their training be instructed in these guidelines to enable them to determine which scenarios are beyond their ability to handle safely.

Firefighters Responding to Propane and Gasoline Fires.

29 CFR 1910.120(q)(6)(ii) and (iii)

Firefighters trained to the operations level, who are also trained in the hazards of propane, may enter the danger area to shut off the valves that will starve the fire and thus extinguish it. Normally, employees trained to the operations level would be restricted from taking aggressive action. This is considered to be a special case. The principle hazards from propane are fire and explosion, not toxicity. Because propane fires are common, most firefighters are fully trained and equipped to respond to propane fires, including taking aggressive action by shutting off the valves in the danger area.

If firefighters are fully trained and equipped (which is a high degree of training), and have also received first responder operations level training, OSHA believes they have sufficient training to take aggressive action due to propane's relatively low toxicity.

It would be only a technical violation of 29 CFR 1910.120(q)(6) for not having the additional training required of a HAZMAT technician if a firefighter took aggressive action in the danger area during a propane fire of leak, was fully trained and equipped to handle the fire and had first responder operations level training. In this circumstance OSHA would not issue a citation.

Releases of gasoline similar to the example involving propane discussed above may be addressed by operations level emergency responders if they have the required PPE, emergency response equipment, and specific training in the safety and health hazards associated with gasoline.

Employers who expect firefighters to shut off a gasoline valve in the danger area, and who can show that employees are trained to the operations level and adequately trained in the hazards of gasoline, have committed a technical violation of 1910.120 (q)(6)(iii) for such employees not having the training required of a HAZMAT technician.

NOTE: The fire and explosion hazards of propane and gasoline are very substantial. The interpretations herein are applicable only when firefighters are fully trained and equipped to handle the explosion and fire hazards of propane, gasoline, or similar gases and liquids.

Firefighters Taking Aggressive action and Technical violations

29 CFR 1910.120(q)(6)(iii)

It would be only a technical violation of 29 CFR 1910.120(q)(6) for not having the additional training required of a HAZMAT technician if a firefighter took aggressive action in the danger area during a propane fire or leak, was fully trained and equipped to handle the fire and had first responder operations level training. In this circumstance OSHA would not issue a citation.

If an injury occurred during an emergency response involving these responders (operations level plus additional training) the CSHO would need to consider whether the responders' training and experience were sufficient for the tasks being performed.

A violation of training requirements that resulted in an actual injury to an employee during an emergency response by definition cannot be a "technical violation." Thus, if an injury occurred and the CSHO determined that the responders' training and experience were not sufficient for the tasks being performed, then a citation should be issued noting a violation of 29 CFR 1910.120(q)(6)(iii) and carrying a penalty that requires abatement. Whether abatement should require full training in all of the competencies of the HAZMAT technician level, or whether certain training requirements could safely be omitted, would depend on the training needed to safely perform the tasks in question.

If, however, the CSHO determined that the training which had been provided to the employees in question had been provided to the employees in question had been adequate, then the training violation would be considered a de minimis violation and no citation would be issued for inadequate training. In this situation the CSHO might determine that the cause of the injury was due to a violation of some other requirement of 29 CFR 1910.120 or other standards, for which a citation carrying a fine and requiring abatement would be appropriate.

DOT Guidebook Changes: Rationale and Training Ramifications

Statement of the Problem:

When the 1993 DOT Emergency Response Guidebook (DOTERG) was modified into the 1996 North American Emergency Response Guidebook (NAERG), it was changed in a significant manner. These changes require additional training for personnel who will be replacing the 1993 DOTERG with the 1996 NAERG. In addition, courses that contain Emergency Response Guidebook training need to be modified to address the changes between the 1993 and the 1996 versions.

This abstract, which is limited to two pages in length, cannot possibly identify all the changes between the two versions, but it will provide an overview of the significant changes.

Change	1993 version	1996 version

Title	1993 Emergency Response Guidebook	1996 North American Emergency Response Guidebook
Audience	U.S. only	U.S., Canada, Mexico
White pages, in front of Table of Placards	6 pages	12 pages
Safety Instructions: Title	On-Scene Safety	Safety Precautions
Safety Instructions: Content	5 steps, including:	7 steps, including:
	Approach cautiously	Approach cautiously from upwind
	Identify the hazards	Secure the scene
	Secure the scene	Identify the hazards
	Obtain help	Assess the situation
	Decide on site entry	Obtain help
		Decide on site entry
		Respond
Who to call for assistance	U.S. only	U.S., Canada, Mexico
Table of Placards	U.S. placards only	U.S., Canada placards
Yellow Index	approximately 2800 entries	approximately 3800 entries
Blue Index	approximately 2600 entries	approximately 3800 entries

Change	**1993 version**	**1996 version**
Orange Guide Pages	67 one page guides	62 two page guides
	2-digit guide page numbers	3-digit guide page numbers
	6 categories, including:	8 categories, including:
	Fire or explosion hazards	Fire or explosion hazards
	Health hazards	Health hazards
	Emergency Action Procedures	Public Safety procedures
	Fire procedures	Protective clothing guidelines
	Spill or leak procedures	Evacuation guidelines
	First Aid procedures	Fire procedures
		Spill or leak procedures
		First Aid procedures
Table of Isolation & Protective Action Distances	approximately 245 entries	approximately 515 entries
	feet & miles	meters(feet) & kilometers(miles)
	500 feet smallest distance	100 feet smallest distance
List of water-reactive mat'ls	non-existent in this version	50 entries in this version
Glossary	non-existent in this version	40 entries in this version

Recommended Solution:

As stated previously, these changes require additional training for personnel who will be replacing the 1993 DOTERG with the 1996 NAERG. In addition, courses that contain Emergency Response Guidebook training need to be modified to address the changes between the 1993 and the 1996 versions.

Grantees should either revise their existing training materials or obtain materials that have been revised to address the 1996 NAERG. Once materials have been revised or obtained, grantees will need to conduct training that teaches responders how to properly use the new 1996 NAERG.

OSHA and Other Regulatory Changes

Statement of the Problem:

It has become a major endeavor to keep abreast of the dynamic changes occurring in the regulatory community. For example, the Occupational Safety and Health Administration (OSHA) is constantly revising existing regulations and developing new regulations. Once these new regulations and/or changes to existing regulations are promulgated, the first awareness an agency may have of the new/changed regulation is when a compliance audit occurs.

Two such examples of significant regulatory changes that have occurred are included in this abstract.

In addition, keeping current on regulations in the past has been a costly endeavor if you utilized sources such as the U.S. Government Printing Office or a regulatory subscription service.

A. OSHA Personal Protective Equipment (PPE) rule changes

Although it has been a couple of years since the PPE rules were revised, we are using this rule change as an example in this abstract since very few individuals responsible for regulatory compliance seem to be aware of this set of changes.

We cannot address the entire set of PPE rule changes in this abstract, so we are identifying one significant area that could have an impact on every organization that uses PPE, the requirement for conducting a Hazard Assessment as found in 29CFR1910.132(d), which reads as follows:

(d) Hazard assessment and equipment selection.

(1) The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the employer shall:

(i) Select, and have each affect employee use, the types of PPE that will protect the affected employee form the hazards identified in the hazard assessment;

(ii) Communicate selection decisions to each affected employee; and

(iii) Select PPE that properly fits each affected employee.

Note: Non-mandatory Appendix B contains an example of procedures that would comply with the requirement for a hazard assessment.

(2) The employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and which identifies the document as a certification of hazard assessment.

B. EPA changes to the Extremely Hazardous Substance Lists

As of May 7, 1996, EPA took final action on two proposed rules that modify the Extremely Hazardous Substances (EHS) list and Reportable Quantities (RQ) under section 302 of the Emergency Planning and Community Right-to- Know Act of 1986, also known as Superfund Amendments and Reauthorization Act (SARA Title III). EPA raised the statutory reportable quantities (RQs) for 202 EHSs and EPA removed four chemicals from the EHS list.

The effective date of these changes was July 8, 1996.

For further information on these EPA rule changes, contact the EPCRA Hotline at 1-800-424-9346 and reference changes to 40CFR Part 355 as identified in the Federal Register, May 7, 1996 (Volume 61, Number 89), Rules and Regulations, pages 20473 - 20490, or reference Docket Number 300 PQR2. Single copies are free.

Recommended Solution:

The easiest and most cost effective method to stay current with regulatory changes is to empower your personnel responsible for regulatory compliance by providing them access to the regulations via the Internet. Agencies that were paying an average of $2,500 per year for hard copy or CD-ROM regulation subscription services can obtain the same regulations "FREE" via the Internet. In addition, the internet downloaded regulations contain federal interpretations that explain difficult to understand sections. The URL addresses are:

For OSHA = www.osha.gov

For EPA = www.epa.gov

For DOT = www.dot.gov

For FEMA = www.fema.gov

The URL address will get you to the regulatory agency's home page where you can then use their search engine to find the specific regulation you desire. Once you locate the regulation in question, download it onto your hard drive.

Alternative Fuels

Background:

Since the oil embargo of the 1970's, alternative fuel development for vehicles has gained a greater portion of the market share. In addition, many cities are faced with EPA clean-air standards, expressing the need to convert vehicles to alternative cleaner burning fuels. As legislation , such as the Clean Air Act, starts to become fully implemented and states such as New York and California implement their vehicle emission standards the demand for motor vehicles that operate on fuels other than gasoline and diesel fuel will significantly increase.

Many vehicles today are operating on Liquefied Petroleum Gas (propane), Compressed Natural Gas (CNG), and Methanol or Ethanol fuels. The next major materials in the propulsion market will be electric power and Liquefied Natural Gas (LNG). Personal cars and fleets of all types ranging from taxi cabs, buses, delivery vehicles, and trains are operating today in most major cities and metropolitan areas on fuels other than the standard gasoline or diesel product. Manufacturers of cars, trucks, and buses using new fuels sources is on the increase. The flexible-fueled vehicles (FFV's) can run on gasoline or ethanol, compressed natural gas (CNG), liquefied hydrogen, propane, as well as electric batteries.

All vehicles, whether powered by alternative fuel or conventional gasoline, must be certified by the manufacturer to meet federal motor vehicle safety standards (FMVSS). Even though these standards for safety are met, there has been no method developed to identify the type of fuel the first responder would be faced with.

Statement of the Problem:

The new systems pose a wide variety of new concerns to the emergency community of fire, police, and emergency medical personnel. Electric vehicles may be using large quantities of lead-acid batteries or generating electricity of 300 volts. Other vehicles may be using methanol or ethanol fuels which require special extinguishing agents to control fires. Compressed natural gas cylinders of 3,000 pounds pressure are now located in trunks of vehicles and railroad engines are now operating on Liquefied Natural Gas supplies being pulled behind the engine in a special tank car. Filling stations across the nation are installing compressor and cascade bottle fueling systems to fuel the natural gas vehicle. Small trailer mounted cascade systems are being pulled behind vehicles to provide roadside service to those vehicles that run out of natural gas. Utility companies in New York State will soon be marketing home compressors for vehicle owners to refuel their Compressed Natural Gas vehicle in their own garage. The National Highway Transportation Safety Board has found the issue of alternative fuels significant enough to

publish a special awareness bulletin alerting responders of the potential dangers of the new fuels.

Recommended Solution:

Emergency response personnel need to be trained to recognize or identify vehicles with alternative fuel systems and be trained in the appropriate safety issues associated with each new fuel system. Since all the systems are using hazardous materials, it is most appropriate that the training be covered under hazardous materials curriculum.

Grantees should develop training that meets the audience of fire, police and EMS, as well as the general public. The course work should describe:

- A method to identify alternative-fueled vehicles
- Special procedures t follow that would address the areas of:

- Fire

- EMS

- Law Enforcement

- Bystanders

- Others at the scene of an alternative-fueled vehicle crash

As part of the program, training in the readiness of emergency response units to handle these types of incidents is essential. This training would involve the basics in fire, victim extrication, fuel or battery leakage, and scene evacuation. The course work should also describe, at a minimum, the following:

- Chemical and physical properties for the various fuels, i.e., LPG, LNG, LH, and electro-chemical cells (batteries)
- Personal Protective Equipment (PPE)
- Suppressant Agents
- Incident Management System (IMS)
- Mitigation and Clean-Up Requirements
- The potential for Boiling liquid/Expanding Vapor Explosion (BLEVE)

This course should develop into an awareness, first responder, and technician level to support the degree for technology and level of response a community could support.

Carbon Monoxide Response

Statement of the Problem:

Fire department units may encounter carbon monoxide in many different situations and incident types. These settings can range from small dwellings to large industrial facilities. CO gas will be produced from all forms of combustion that involve carbon-based fuels. Concentrations will be dependent on the type of fuel and the form or efficiency of combustion. In recent years, these incidents have been on the increase in urban as well as rural areas.

Carbon monoxide is an invisible, odorless, tasteless, and colorless gas that has the same density as air and will not float or sink, but will disperse throughout a structure.

Carbon monoxide gas is a chemical asphyxiant and will replace oxygen in the bloodstream, resulting in suffocation. This gas also has a wide flammable range; from a lower explosive limit of 12.5% in air to an upper explosive limit of 74% in air. It has an ignition temperature of 1128 degrees Fahrenheit. The National Fire Protection Association (NFPA) fire diamond will show CO as a 3 in health, a 4 in flammability, and a 0 reactivity.

The primary hazard of carbon monoxide gas is that of an asphyxiant with relatively low levels producing adverse health effects. These effects can range from mild headache after two hours of exposure to 200 parts per million (PPM) to unconsciousness after 30 minutes exposure to 1600 PPM. OSHA has set a level of no more than 35 PPM as an allowable workplace standard for an 8-hour day, and the EPA has established that residential levels should not exceed 9 PPM over an 8-hour average.

Symptoms from exposure to lower level concentrations include headache, nausea, dizziness, weakness, difficulty breathing, and other flu-like problems. Exposure to high levels will cause cyanosis, hallucinations, angina, and unconsciousness. Any patients suspected of having CO poisoning shall be moved to a fresh environment, placed on high flow O_2 and transported to the closest medical facility.

Residential CO problems can normally be traced to problems that include, but are not limited to, the use of gas furnaces, gas dryers, gas stoves, fireplaces, kerosene heaters, bar-b-que's, or vehicle that are running in or near the structure. Indications of incomplete combustion from gas burning appliances include yellow flame, soot build-up on roof vents, and soot build-up on interior walls. All possible sources shall be checked, and certified repair technicians shall be called as necessary. Southwest Gas shall be notified if any signs or symptoms of CO poisoning are exhibited.

Industrial CO problems can be associated with large furnace type operations, large scale equipment that utilize combustion type engines, or leaks from cylinders that contain compressed carbon monoxide gas. Any operation of an internal combustion engine in a confined space without adequate ventilation will create a highly dangerous and life-threatening environment.

Residential CO detectors are available and will sound two types of alerts. The first is a warning chirp that notifies there is a developing or chronic CO problem that will produce a 4-7% carbon monoxide in blood hemoglobin level over time. In the event of a warning signal, the residence should be ventilated, the test button should be pushed, and all possible sources of CO shall be checked and adjusted or repaired. The warning level is set at 60 PPM CO for greater than 66 minutes. The second alert is a full alarm that warns of levels that will produce 8-10% carbon monoxide in blood hemoglobin levels. The detector will alarm at these three points: 100 PPM will trigger an alarm within 90 minutes, 200 PPM will trigger an alarm within 35 minutes; and 400 PPM within 15 minutes.

A full alarm indicates that dangerous levels of CO have been reached and that immediate action should be taken. These actions include evacuation, ventilation, investigation, and denying access until the source of the CO is secured.

Additionally, the increased use of CO detectors has resulted in many local responders (fire, police, and EMS) being burdened with numerous calls but without a clear and definitive standard operating procedure (SOP) and proper training. Many published SOPs conflict with each other. It is reported by American Medical Association (AMA) that CO is responsible for 800 to 1,000 deaths per year and some 10,000 people seek medical attention.

Recommended Solutions:

Training programs should be made available to address this issue. One possibility is that the response committee could prepare a training program to address limitations of home detectors as well as limitations of responder carried monitoring devices. The program could discuss signs and symptoms of CO poisoning; proper entry procedures and techniques, and post response action and follow-ups.

Grantees should develop awareness and operational level course work that identifies the hazards, toxicity, and general response activity associated with being deployed to CO alarms. This course work should be developed in such a way as it could be aired as Public Service Announcements (PSA) for the awareness level to the general public. The first responder level of training should focus on the hazards and toxicity outlined in the problem statement. It should also be presented in a solution based format as to have value to the first responder as well as the customer.

Training should also be supported by appropriate standard operating guidelines for first responder A sample of an SOP is provided below.

All CO detector alarms shall be addressed as an emergency until no hazard has been identified. Steps taken shall include, but are not limited to:

- Verify detector is CO type

- Check for CO related symptoms and evacuate structure as necessary
- Check power supply to detector
- Assess scene for CO sources
- Determine need for additional resources: HazMat or other units for CO meters, utility company, police department, etc.
- Utility company shall be notified if any signs or symptoms are present.

CONSUMERS POWER COMPANY "MAKE THE RIGHT CALL" CAMPAIGN

During Michigan Carbon Monoxide Safety Week *(October 1996)*

Last year, Consumers Power Company first unveiled "Make The Right Call", a comprehensive education campaign designed to inform natural gas customers about facts concerning carbon monoxide (CO). The goal was to help natural gas customers better protect their families from CO poisoning, while reducing the number of non-emergency CO calls to fire, medical and utility services. Early statistics suggest the program has been effective.

Year-to-date, Consumers Power Company has responded to 6,496 CO emergency calls compared to 9,726 calls received for the same period in 1995. "What these numbers suggest is that our customers are better equipped with the knowledge necessary to make the right decisions to protect the health and safety of their families," stated Paul A. Elbert, Executive Vice President and Chief Operating Officer of the utility's natural gas division. "Our first responsibility to our customers is the safe, reliable delivery of gas through our pipelines," Elbert said. "We are unwavering in our commitment to provide quick response when a customer suspects a gas leak. However, providing the same level of response to non-emergency CO calls affects our ability to react to emergency calls. *Make The Right Call* campaign is designed to help ensure that the first call our customers make is indeed the right call. Our concern is not only for the health and safety of the call, but also for the others who may be in need of emergency assistance."

The natural gas industry has seen CO calls increase significantly in the past few years. In 1994, Consumers Power Company responded to 8,400 CO calls and, in 1995 calls increased to 13,080 - the vast majority of which involved non-emergency situations. *Make The Right Call* was designed to preserve Consumer Power's ability to safeguard the public through an educational outreach program to help manage the growing number of CO calls. The program encourages customers to evaluate their circumstances and respond in the appropriate way. If a gas leak suspected because of the smell of the odorant in gas, the "Right Call" is for the customer to contact the gas utility company immediately. However, if CO is suspected and there is a medical symptom, the "Right Call" would be for medical assistance or, in a serious emergency, to 911. If there are no CO health symptoms present, but CO is suspected, the "Right Call" could be to a qualified appliance repair dealer.

Prevention and protection are also emphasized under *Make The Right Call*. The first line of defense in preventing CO poisoning is the proper installation, maintenance, and routine inspection of appliances. Properly installed and adjusted natural gas appliances are safe and reliable. Of the 5,000 deaths caused by CO poisoning each year, approximately 50 are caused by improperly operating appliances (Gas Resources Institute).

The second line of defense is the installation of an Underwriters Laboratories (UL) approved, CO detector equipped with a powerful audible alarm. Consumers Power Company offers exclusive Michigan electric powered, UL approved carbon monoxide detector models Consumers Power 7000 and 4500 by Nighthawk.

CO, an odorless, colorless, and potentially lethal gas can be produced when fuels burn without enough air. Among the symptoms of CO are headaches, burning eyes, nausea, fatigue, dizziness, drowsiness, and unconsciousness. CO poisoning can occur in a new house or an old one. If not properly installed or when operating incorrectly, household appliances like furnaces, water heaters, wood stoves, fireplaces, kerosene heaters, or charcoal grills - anything that burns fossil fuels - can produce CO. Infants, the elderly and people with respiratory problems are especially susceptible to CO poisoning.

Consumers Power Company, the principle subsidiary of CMS Energy Corporation (NYSE:CMS), is Michigan's largest utility providing natural gas and electricity to more than six million of the state's nine and one-half million residents in all 68 Lower Peninsula counties.

SOURCE: Consumers Power Company, 10/28/96

CONTACT: Lori Zublik of Consumers Power Company at (517) 788-2394

Consumers Power Company's press releases available through Company News On-Call by fax # 800-758-5804, extension #203850, or internet http://www.prnewswire.com/

(CMS)

Sick Building Syndrome

Statement of the Problem:

More reliance on 911 and increase in energy-efficient (tight) building construction has caused a dramatic increase in complaints, forcing first responder and hazmat teams to function in nontraditional roles. By some estimates, as many as 15% of the buildings in the United States could be classified as sick and another 15% as suspect. The use of synthetic building materials and a continued or increased use of cleaner, insecticides, and health care products only compounds the problem. The public expects local responders, with their fancy instruments and other high-tech toys, to be able to immediately diagnose the problem and provide quick fixes.

Recommended Solutions:

The response committee could prepare training guidance to the grantees on how to respond to sick or allegedly sick buildings. The program would present model standard operating procedures (SOPs), lists of recommended equipment, and recommendations regarding other resources and agencies to whom the call may be referred. A discussion of real signs and symptoms for classic overexposures would be discussed, as well as guidance on identifying and treating psychosomatic and mass hysteria phenomena.

Guidelines for Improving LEPC Exercises

Statement of the Problem:

Nearly every LEPC has written an emergency response plan and eventually elects to exercise the plan. Some simple steps in preparation can build success and help avoid chaos.

Many exercises fail because they do not have clear objectives, lack definitive goals, and they try to encompass too many unrealistic failures or events. Many exercises fail or are unsuccessful learning tools due to the lack of an effective plan, an effort to sensationalize, or the event simply gets out of hand.

Police departments conduct hostage training exercises with perfection. Fire departments conduct simulated rescue drills with precise accuracy. Emergency medical personnel conduct mass casualty drills with the highest level of care. Emergency management agencies conduct nuclear power plant exercises with precise measurements. Hazardous materials teams can patch a leaking tank car in minutes. Why then do so many hazardous materials exercises fail when these same agencies come together? The answer may be found in a few simple considerations.

Successful exercises of plans are limited in scope, have a clear starting and ending point, and all participants have clear direction as to their role and function.

Recommended Solution:

Some simple, but crucial steps taken during the planning phase can produce huge dividends in the results. The exercise of a plan should be designed for success.

An example of planning tips may include the following items:

1. Identify a lead agency, organization, individual. Select the agency who will actually be the first response personnel.

1. Select one component of a site plan and build the scenario around that potential incident.
2. Clearly define the exercise objective, the participants goals, along with the ending point. It is also helpful to define the command structure and if command is expected to be transferred.
3. Build into the exercise at least one, or more if needed, TIME OUTs. This will allow the exercise leader to review successful events and work with participants to get the exercise back on track if it has strayed.
4. Select one or more safety officers who must prepare a site safety plan that will be used prior to and during the exercise.
5. Keep the exercise as simple as possible, centered on one event, and keep it realistic.
    1. Conduct a walk through exercise prior to the real test.

Note: This list would be added to and contains some suggestion on how to accomplish results.

Techniques to Improve Scenario Training for Hazardous Materials Courses

Statement of the Problem:

Historically, hazardous materials practical scenario training, whether conducted by tabletop exercise or by hands-on drill, has met with disappointment. Information gathered from participants, instructors, and critiquers from around the country have revealed these common problems:

- Scenarios have not been reality based; many introduce exotic materials at improbable locations.
- Scenarios did not have clearly defined objectives or had too many objectives.
- Critiques were often vague, because learning objectives were unclear and thus not easily measured.
- Individuals providing critiques were not well versed in the subject matter or did not understand the true objectives.
- Instructors or scenario designers often had unrealistic expectations of students, expecting results in areas the participants had not been trained, such as appointing a student to be the incident commander during task level training.
- Scenarios contained too much pretense regarding existing hazards, as when participants are told to respond as though they could see and feel the flames or vapor clouds.
- Scenarios contained too much pretense regarding use of equipment and supplies, as when participants are told to simulate the use of protective clothing, respiratory protection, containment/confinement equipment, or monitoring devices.

Recommended Solutions:

The Response Committee will prepare scenario guidance to the grantees. This guidance will consist of the following elements:

- Scenario boilerplates will be developed to meet objectives set forth in the *Guidelines for Public Sector Hazardous Materials Training* (*Guidelines*).
- Boilerplates will be designed to meet the needs of exercises specified under SARA Title III, and other laws requiring scenario based training.
- The committee will identify what sections within the *Guidelines* that could be enhanced by scenarios, and will provide appropriate examples. Guidance will consider simple, realistic, learn and win scenarios.
- The committee will provide basic instruction in design, development, delivery and evaluation of scenario training. Included will be such items as how to create scenarios which appear realistic, but are actually safe and easy. For example, utilizing water-soluble food products such as molasses, Karo syrup, chocolate syrup, jello and frozen juices to simulate hazardous materials.
- The committee will recommend basic equipment and supplies that should be available for boilerplate scenarios.
- The committee will develop a Scenario Assessment Worksheet to:

- Gather descriptive information about hazardous materials response scenario training in a standardized format.

- Facilitate comparison of scenario training with recommendations contained in the *Guidelines*.

- Assist grantees in assessing the value of training scenarios.

Improving HMEP Grantee Input into NFPA Rulemaking Processes

Statement of The Problem:

NFPA standards related to hazardous materials response are in a constant state of change, reflecting the dynamic nature of the field. State and local hazardous materials response training systems are regularly impacted by changes to the standards, because their training programs are usually the first step in implementation of the changes in the field. This impact is often logistically significant. HMEP grantees and others involved in managing hazardous materials training systems frequently experience heavy additional costs and staff demands when changes are made to the standards, to retool training programs and training aids, refresh instructors, and modify response plans and procedures impacted by the changes.

Yet historically, state and local training systems, SERCs and LEPCs have provided few if any comments into the NFPA rulemaking process. NFPA employs a process that includes, for every standard, scheduled windows of time for full public and professional input into the revision process. In order to properly represent their stake in the outcome, it is essential that state and local training system managers, SERC and LEPC members take a more active role in providing input and recommendations to NFPA regarding changes they would like to see in the standards.

Recommended Solution:

The response committee will assist HMEP grantees in providing timely input into the rulemaking process for relevant NFPA hazardous materials standards. At each HMEP grant workshop, committee members and NFPA representatives will highlight for the grantees those standards which are coming up for public comment and will provide forms and instruction to workshop participants on how and when to submit comments. The committee will also regularly include this information in its reports in writing and on the new HMEP internet site when it is on-line. The NFPA has expressed its support for this effort and its interest and commitment in doing everything possible to facilitate HMEP grantee participation in the rulemaking process.

Immediate Opportunities for Input:

There are two NFPA standards presently calling for pubic comment which relate to hazardous materials training.

NFPA 1201 Developing Fire Protection Services for the Public

This standard includes a chapter on minimum requirements for the organization, operation, deployment and evaluation of hazardous materials response. Changes to this standard could impact staffing and level of competency requirements for adequate response at the department level, which would in turn directly impact hazardous materials awareness, operations, incident commander and technician training requirements for fire service and EMS personnel within HMEP grantees' jurisdictions. The comment period for this standard is January 1997 - April 11, 1997.

NFPA 1420 Pre-Incident Planning for Warehouse Occupancies

This standard provides recommended practices for pre-planning warehouse occupancies, including identifying hazardous materials hazards. Changes to this standard could moderately impact response planning requirements at the LEPC level for local facilities. The comment period for this standard is January 1997 through October 1998.

The Rulemaking Process:

The process leading to the publication of an NFPA committee document offers several opportunities for

grantees to participate. NFPA has a Standards Council. This council reviews proposed standards projects and public comments and assigns a Technical Committee (TC) if they determine there is a need for the proposed project. If the project spans the scope of more than one committee, the Standards Council appoints a Technical Correlating Committee (TCC). This committee coordinates and supervises the work of the Technical Committees to ensure no conflicts exist and that there is a satisfactory correlation among the documents developed by these Technical Committees. There is a period of 24 weeks when the Technical Committee calls for proposals to amend an existing document or for recommendations on a new document. The committee then meets to act on proposals, develop its own proposals and to prepare its report. The committee votes on the proposals. they need two-thirds approval before the Report on Proposals (ROP) can be published. The ROP is then circulated for public review and comment. The committee meets to review and decide its action on each public comment. A two-thirds approval vote by the committee on the actions of the comments is need for the Supplementary Report or Report on Comments (ROC) to be published. The NFPA meets for its Annual or Fall meeting and acts on the ROP and ROC. After a debate on these reports, NFPA members vote to approve, amend or return a portion or the entire report to the committee. There is a period of 20 days after the NFPA Annual or Fall meeting when a notification of intent to file a complaint to the Standards Council can be filed. The Standards Committee then decides whether or not to issue the standard or to take other actions. An appeal can be filed to the Board of Directors on the Standards Council Action within 20 days of the action, if the standard is not issued.

Anyone can submit a request for a new fire safety standards project. Also, anyone can submit a proposal for text to be included in the new document or to amend text in an existing document. Anyone can also submit comments to proposed changes published in the ROP. Attached is a sample copy, a blank copy and instructions on how to fill out the form for comments on NFPA Report on proposals.

Revision Cycle for NFPA Standards

STANDARD	CYCLE	SCOPE
402M	Annual Mtg 2001	Provides aircraft rescue and fire fighting operational procedures for airport fire departments to assure the efficient utilization of the available aircraft rescue and fire fighting equipment and personnel provided.
471	Fall Mtg 1996	Outlines the minimum requirements that should be considered when dealing with responses to hazardous materials incidents and to specify operating guidelines for responding to hazardous materials incidents.
472	Fall Mtg 1996	Covers the requirements for first responder, hazardous materials technician, and hazardous materials specialist.
473	Fall Mtg 1996	Identifies the levels of competence required of EMS personnel who respond to hazardous materials incidents. It specifically covers the requirements for basic life support and advanced life support personnel in the pre-hospital setting.
1200	Fall Mtg 1997	Includes minimum requirements relating to the organization, operation, deployment, and evaluation of public fire protection and emergency medical services.
1405	Fall Mtg 2000	Identifies the elements of a comprehensive marine fire fighting response program, including, but not limited to, vessel familiarization, training considerations, pre-fire planning and special hazards, that will enable land-based firefighters to safely and efficiently extinguish vessel fires.
1420	Annual Mtg 1998	This document is a recommended practice for the effective evaluation of the fire protection and operating features of a warehouse occupancy and the development of a pre-incident plan for response to fires and like emergencies. The pre-incident plan may be used by responding personnel to manage fire emergencies and other related incidents in these facilities with available resources.
1500	Annual Mtg 1997	Covers minimum requirements for a fire service related occupational safety and health.

1561	Annual Mtg 2000	Covers minimum requirements for an incident management system to be used by fire departments to manage all emergency incidents.
1581	Annual Mtg 2000	Contains minimum requirements for a fire department infection control program.
1582	Annual Mtg 1997	Covers minimum medical requirements for fire fighters, including full-time or part-time employees, paid or unpaid volunteers.
1600	Annual Mtg 1999	This standard shall establish minimum criteria for disaster management and provide guidance to the private and public sectors in the development of a program for effective disaster preparedness response and recovery.
1991	Annual Mtg 1999	Covers design criteria, performance criteria, and test methods for Vapor-Protective Suits designed to protect emergency response personnel against exposure to specified chemicals in vapor and liquid splash environments during hazardous chemical emergencies.
1992	Annual Mtg 1999	Covers design criteria, performance criteria, and test methods for Liquid Splash-Protective Suits designed to protect emergency response personnel against exposure to specified chemicals in liquid-splash environments during hazardous chemical emergencies.
1993	Annual Mtg 1999	Specifies minimum documentation, design criteria, performance criteria, and test methods for Support Function Protective Garments.

NFPA Rulemaking Schedule

Cycle Checkpoint	**Fall 96**	**Annual 97**	**Fall 97**	**Annual 98**	**Fall 98**
Notification of Intent to Enter Cycle	2/3/95	8/4/95	2/2/96	8/2/96	1/31/97
Public Proposal Closing Date	**7/21/95**	**1/19/96**	**7/19/96**	**1/17/97**	**7/18/97**
Final Date for ROP Mtg.	**10/13/95**	**4/12/96**	**10/11/96**	**4/11/97**	**10/10/97**
All Report Copy in Hands of Staff Liaison (except for ballots)	10/13/95	4/12/96	10/11/96	4/11/97	10/10/97
Final Date for Mailing Technical Committee Ballot	10/27/95	4/26/96	10/25/96	4/25/97	10/24/97
Final Date for Mailing Technical Correlating Committee Ballot	11/17/95	5/17/96	11/15/96	5/16/97	11/14/97
Receipt of Ballots by Staff Liaison	12/8/95	6/7/96	12/6/96	6/6/97	12/5/97
Final Copy (including ballot statements) to Secretary, Standards Council	12/22/95	6/21/96	12/20/96	6/20/97	12/19/97
All Copy to Production	1/5/96	7/5/96	1/3/97	7/7/97	1/2/98
ROP to Mailing House	**2/2/96**	**8/2/96**	**1/31/97**	**8/1/97**	**1/30/98**
Comment Closing Date	**4/12/96**	**10/11/96**	**4/11/97**	**10/10/97**	**4/10/98**
Final Date for ROC Mtg.	**6/21/96**	**12/20/96**	**6/20/97**	**12/19/97**	**6/19/98**
All Committee Documentation in Hands of Staff Liaison (except for ballots)	6/21/96	12/20/96	6/20/97	12/19/97	6/19/98
Final Date for Mailing Technical Committee Ballot	7/5/96	1/3/97	7/7/97	1/2/98	7/3/98

Final Date for Mailing Technical Correlating Committee Ballot	7/26/96	1/24/97	7/25/97	1/23/98	7/24/98
Receipt of Ballots by Staff Liaison	8/16/96	2/14/97	8/15/97	2/13/98	8/14/98
All Copy (including ballot statements) to Secretary, Standards Council	8/23/96	2/21/97	8/22/97	2/20/98	8/21/98
All Copy to Production	8/30/96	2/28/97	8/29/97	2/27/98	8/28/98
ROC to Mailing House	**9/27/96**	**3/28/97**	**9/26/97**	**3/27/98**	**9/25/98**
Association Meeting	**11/18-20/96 Nashville**	**5/19-22/97 Los Angeles**	**11/17-19/97 Kansas City**	**5/18-21/98 Cincin-nati**	**11/16-18/98 Atlanta**
Committee Ballot of Association Amendments	1125/96-1/3/97	5/26/97-7/3/97	11/24/97-1/2/98	5/25/98-7/6/98	11/23/98-1/4/99
Standards Council Issuance	**1/15-17/97**	**7/16-18/97**	**1/14-16/98**	**7/15-17/98**	**1/12-14/99**

NFPA Rulemaking Schedule (Continued)

	Annual 1999 TC	**Annual 1999 TCC**	**Fall 1999 TC**	**Fall 1996 TCC**	**Annual 2000 TC**	**Annual 2000 TCC**	**Fall 2000 TC**	**Fall 2000 TCC**
Notification of Intent to Enter Cycle	8/1/97	8/1/97	1/30/98	1/30/98	8/14/98	8/14/98	2/5/99	2/5/99
Proposal Closing Date	1/2/98	1/2/98	7/3/98	7/3/98	1/8/99	1/8/99	7/2/99	7/2/99
Final Date for ROP Mtg.	3/27/98	2/27/98	9/25/98	8/28/98	4/2/99	3/5/99	9/24/99	8/27/99
Final Date for Mailing TC Ballot	4/10/98	3/13/98	10/9/98	9/11/98	4/16/99	3/19/99	10/8/99	9/10/99
Receipt of TC Ballots by Staff Liaison (previously all ballots)	5/15/98	4/3/98	11/13/98	10/2/98	5/21/99	4/9/99	11/12/99	10/1/99
Receipt of TC Recirc Ballot	5/22/98	4/10/98	11/20/98	10/9/98	5/28/99	4/16/99	11/19/99	10/1/99
Final Date for TCC Meeting		5/8/98		11/6/98		5/14/99		11/5/99
Final Date for Mailing TCC Ballot		5/15/98		11/13/98		5/21/99		11/12/99
Receipt of TCC Ballot		6/5/98		12/4/98		6/11/99		12/3/99
Receipt of TCC recirc Ballot		6/12/98		12/11/98		6/18/99		12/10/99
Final Copy (include ballot stmnts) to Secretary, Stds Council	6/5/98	6/19/98	12/4/98	12/18/98	6/11/99	6/25/99	12/3/99	12/17/99
All Copy to Production/Printer	6/26/98	7/3/98	12/28/98	1/4/99	7/2/99	7/9/99	12/27/99	12/31/99
ROP to Mailing House	7/24/98	7/24/98	1/22/99	1/22/99	7/30/99	7/30/99	1/21/00	1/21/00
Comment Closing Date	10/2/98	10/2/98	4/2/99	4/2/99	10/8/99	10/8/99	3/31/00	3/31/00

Final Date for ROC Mtg.	12/18/98	11/13/98	6/18/99	5/14/99	12/27/99	11/19/99	6/16/00	5/12/00
Final Date for Mailing TC Ballot	1/4/99	11/27/98	7/2/99	5/28/99	1/7/00	12/3/99	6/30/00	5/26/00
Receipt of TC Ballots by Staff Liaison (previously all ballots)	2/5/99	12/18/98	8/6/99	6/18/99	2/11/00	12/27/99	8/4/00	6/16/00
Receipt of TC Recirc Ballot	2/12/99	12/28/98	8/13/99	6/25/99	2/18/00	1/3/00	8/11/00	6/23/00
Final Date for TCC Meeting		1/15/99		7/16/99		1/21/00		7/14/00
Final Date for Mailing TCC Ballot		1/22/99		7/23/99		1/28/00		7/21/00
Receipt of TCC Ballot		2/12/99		8/13/99		2/18/00		8/11/00
Receipt of TCC recirc Ballot		2/19/99		8/20/99		2/25/00		8/18/00
Final Copy (include ballot stmnts) to Secretary, Stds Council	2/26/99	2/26/99	8/27/99	8/27/99	3/3/00	3/3/00	8/25/00	8/25/00
All Copy to Production/Printer	3/5/99	3/5/99	9/3/99	9/3/99	3/10/00	3/10/00	9/1/00	9/1/00
ROC to Mailing House	3/26/99	3/26/99	9/24/99	9/24/99	3/31/00	3/31/00	9/22/00	9/22/00
Association Meeting	5/17-20/99	5/17-20/99	11/15-17/99	11/15-17/99	5/21-25/00	5/21-25/00	11/13-15/00	11/13-15/00
Complaint Closing Date	6/11/99	6/11/99	12/10/99	12/10/99	6/19/00	6/19/00	12/8/00	12/8/00
Council Issuance	7/16/99	7/16/99	1/14/00	1/14/00	7/20/00	7/20/00	1/13/01	1/13/01
Appeal to Board	8/6/99	8/6/99	2/4/00	2/4/00	8/11/00	8/11/00	2/2/01	2/2/01

Instructions to Submitting Comments on NFPA Report on Proposals

1. Type or print in Black Ink.
1. Indicate the number, edition year, and title of the document. Also indicate the specific section or paragraph that the proposed amendment applies to.
1. Indicate the proposal number to which the comment is directed.
1. Check the appropriate box to indicate whether this comment recommends adding new text, revising existing text, or deleting text.
1. In the space identified as "Comment" indicate the exact wording you propose as new or revised text, or the text you propose be deleted.
1. In the space titled "Statement of Problem and Substantiation for Comment" state the problems which will be resolved by your recommendation and give the specific reason for your comment. Include copies of test results, research papers, fire experience, or other materials that substantiate your recommendation.
1. Check the appropriate box to indicate whether or not this comment is original material, and if it is not, indicate the source of the material.
1. Sign the comment.

If supplementary material (*photographs, diagrams, reports, etc*) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee. The technical committee is authorized to abstract the "Statement of Problem and Substantiation for Comment" if it exceeds 200 words for publication in the Report on Comments.

NOTE: The NFPA Regulations Governing Committee Projects in Paragraph 3-4.5 state: Each comment shall be submitted to the Council Secretary and shall include:

(a) identification of the submitter and his or her affiliation (i.e., technical committee, organization, company),

where appropriate;

(b) identification of the document, and proposal number to which the comment is directed, paragraph of the document to which the proposal is directed;

(c) the proposed text of the comment, including the wording to be added, revised (and how revised), or deleted;

(d) a statement of the problem and substantiation for comment; and

(e) the signature of the submitter.

Upcoming Changes to NFPA 471, 472, 473

Background

The National Fire Protection Association (NFPA) is presently in the process of implementing changes to three definitive standards impacting training for hazardous materials response. The three standards are:

- NFPA 471-1992: Recommended Practice for Responding to Hazardous Materials Incidents
- NFPA 472-1992: Standard on Professional Competence of Responders to Hazardous Materials Incidents
- NFPA 473-1992: Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents

The changes to these standards have been under deliberation for some time. Following the full NFPA rulemaking process, the NFPA Committee on Hazardous Materials Response Personnel has performed the following process steps.

1. The committee issued a request for proposed changes to NFPA 471, 472, and 473, and allowed 24 weeks for proposals to be submitted.

2. The committee met and generated a Report on Proposals (ROP) for each standard which specified all proposed changes, and circulated the ROPs for public comment.

3. The committee then met to review and decide on its action for each public comment and proposal for change. The committee findings are in the form of recommendations for actions (to wit: recommendations to accept, accept in part, or reject each proposed change), and these recommendations were summarized in the Report on Comments (ROC).

4. At the Fall 1996 NFPA meeting, the ROC was submitted to the main body for action. Each individual recommendation was voted on separately.

All the changes to NFPA 471, 472, and 473 which were recommended by the committee were approved at the Fall 1996 NFPA meeting. These changes will go into effect in 1997.

Upcoming Changes

The NFPA F96 ROC, specifies the exact and verbatim changes recommended for NFPA 471, 472, and 473. Note that all proposed changes that were accepted by the committee (and subsequently accepted by the membership) are so indicated by a **black vertical line** next to the committee action section for each proposed change. The relevant sections from the complete NFPA F96 ROC, which were distributed to grantees at the December 1996 conference were:

P. 75 Committee on Hazardous Materials Response Personnel Committee membership, scope,and ROC index (parts I, II, and III)

p. 76 Part 1: Committee action on comments received on its Report on Proposals

for NFPA 471-1992

p. 76-99 Part 2: Committee action on comments received on its Report on Proposals

for NFPA 472-1992

p. 99-100 Part 3: Committee action on comments received on its Report on Proposals

for NFPA 473-1992

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Prevention Curriculum Guidelines Development Workplan

Introduction
December 1996
The current edition of the Guidelines for Public Sector Hazardous Materials Training (Guidelines) includes guidance for response and planning training, but does not include guidance for training public sector employees in prevention functions. In the next year and a half, the HMEP grantee community and author team will develop guidance for federal, state and local prevention training. This guidance will be provided to HMEP grantees and will be included in the 1998 edition of the Guidelines. The following workplan includes the work strategy and proposed approach for developing prevention guidelines, author team meeting schedules, author team composition, and the review strategy that will be employed to ensure full input from HMEP grantees, relevant professional associations, and the federal community.

Background Issues

The goal of the prevention curriculum will be to support, through training, better prevention of hazardous materials emergencies through more timely and more effective interventions, decisions and actions by the many different persons who impact, through their normal work, the conditions which create the risks that hazardous materials emergencies will occur.

One challenge of this project is the breadth of roles and job functions potentially impacting hazardous materials prevention. This breadth may make the training arena and variety of training issues to be addressed in the prevention curriculum quite large. Therefore, the number of job functions and professions that might need to be reached to ensure effective prevention programs will probably be quite large also. The functions to be addressed in the curriculum could include architects, engineers, fire department codes inspectors, land use planners, community managers, and many others. For this reason, it is anticipated that the curriculum guidelines will be broad in scope, will address many diverse training audiences, and will encompass many different training requirements, recommended methodologies, and instructional delivery strategies for each of the different audiences.

Another challenge facing the development of prevention guidelines is the inherent ambiguity about what might constitute "prevention training" or "prevention work". This ambiguity stems from the fact that prevention functions are rarely discrete or stand-alone job responsibilities in any profession. Rather, prevention responsibilities and actions are usually integrated into (and often hidden in) the daily work and normal job functions of response and planning personnel and other professionals with responsibilities impacting hazardous materials prevention. For this reason, it is anticipated that extensive analysis will need to be done by the author team in order to properly define, for each job function, all the specific tasks and individual competencies impacting prevention for which training is needed.

A third challenge is the diversity of competencies that may need training, ranging from affective attitudinal issues to demanding technical skills, and the extent that training for individual job functions may differ in complexity to meet critical competencies. In some cases (such as architectural designers) prevention actions and decisions are a relatively small, although critical, subset of the overall job competencies for persons being trained. In other cases, such as on-site inspection and codes enforcement, the technical competency requirements for doing effective prevention actions may be extensive. For this reason, it is anticipated that individual prevention training requirements for the many different audiences, addressed by the prevention curriculum, may vary significantly in length and scope for the different job responsibilities.

Work Strategy for Developing Prevention Guidelines

The author team met on September 29-30, 1996, to prepare a workplan for developing the prevention guidelines. At the meeting, the team determined the analytical strategy to be followed in developing the guidelines, developed a strategy for ensuring full HMEP grantee review and validation of the work to be performed, and established a work timeline which included task assignments and working meeting dates through completion of the project.

The most difficult issue that the author team addressed was to decide on the analytical strategy to be followed in developing the prevention guidelines. A number of different

approaches were discussed in the meeting. Several approaches were actually tried out in brief. The following six step approach was felt to best address the issues and challenges surrounding hazardous materials prevention, and was adopted by the author team as the proposed workplan for developing the prevention guidelines.

1. First, the team will identify all persons by job titles/functions who perform work impacting hazardous materials prevention. This will be a very large and extensive list. This will in essence form a national snapshot of the interrelationships of all the different jobs, professions, functions and persons whose work contribute to or impact the risk that hazardous materials emergencies will occur.
2. Then, the team will analyze and group these into training audience categories. The number of categories may still be large, but will be significantly smaller than the list of prevention job functions. The groupings into training audience categories will be based upon common functions and performance responsibilities that are addressable by training.
3. For each training audience category, the team will analyze the work performed to determine and define major job accomplishments impacting prevention. Note that these major prevention job accomplishments will not be all the major job accomplishments for the category (for example, everything an engineer accomplishes in his/her work) but rather just all the major job accomplishments impacting hazardous materials prevention.
4. For each major prevention job accomplishment of each training audience category, the team will then define the individual competencies needed to effectively achieve the job accomplishment. These competencies will be concrete measurable behaviors that are addressable by training.
5. Based upon the above, the team will then develop recommended training objectives that need to be met to ensure that the students can effectively achieve each competency as defined.
6. Finally, based upon training audience learning characteristics and varied extant training delivery system parameters, the team will prepare training methodology, course format and instructor competency recommendations to support the development and delivery of training to best meet the training objectives as defined for all of the training audience categories in the prevention guidelines.

Grantee Input and Review of Prevention Guidelines

It is essential that there be HMEP grantee input and review during the development of the prevention guidelines to ensure that the final product truly represents the consensus wisdom of the state, tribal and territory grantee offices. Several strategies for HMEP grantee input and review have been proposed in this workplan.

A significant number of HMEP grantees are on the author team, and during the next year most of the lead writing of the actual working drafts will be done by HMEP grantees. In addition, a five person panel of HMEP grantees will be formed, independent of the author team, as a written review team to track the develop of the guidelines and to review and comment on all internal team working documents and meeting products during the next year. HMEP grantees will be fully briefed on work status and developmental issues at the semi-annual HMEP grantee workshops. Finally, all HMEP grantees will be given a three month period to review and comment on the public review draft of the guidelines, scheduled for release to grantees for review in February, 1998.

1. **Prevention Guidelines Development Schedule**

   The following is the work, meetings and review schedule for development of the prevention guidelines. Author team names in parenthesis indicate persons currently assigned to specific tasks. All other tasks are full author team work, with individual assignments to be determined.

   January 25-27,1997 Full author team meeting at NETC, Emmitsburg, Md. At this meeting, the team will:

   1. define all persons by job titles/functions who perform work impacting hazardous materials prevention;
   2. analyze and group these into training audience categories sharing common functions and performance responsibilities; and
   3. for each training audience category, determine major job accomplishments

   Jan 28-Feb 28, 1997 Prepare and distribute prevention work report: training audiences and major job accomplishments (Pearson)

   March 1-3, 1997 Full author team meeting, site to be determined (possibly Salt Lake City, Utah).
   At this meeting, the team will:

   4. define individual competencies (to perform job accomplishments) for each

major job accomplishment for each training audience category;
5. outline recommended training objectives needed to ensure achieving each defined competency (for each major job accomplishment for each training audience category); and
6. outline training methodology narrative for guidelines.

March 4-May 1997 Small team will write the first working draft of the prevention guidelines
(Costello-Kaiser, Steffensen, Pearson)

June 1997 Full team and grantee review group will review first draft of guidelines and will submit written comments

July-August 1997 Small team will revise based on comments received and will develop second working draft of guidelines (Costello-Kaiser, Steffensen, Pearson)

Sept 13,14, 1997 Full author team meeting, site to be determined. Team will review and revise second working draft and will prepare formal review draft of prevention guidelines.

October 1997 Release of formal review draft of prevention guidelines for 3 month public comment period. Material distributed to all HMEP grantees, all relevant professional associations, and the federal community. Comments due by the end of January, 1998

Feb 1998 Full author team meeting, site and date to be determined. At this meeting, team will review all comments received and will finalize prevention guidelines.

April 1998 Final prevention guidelines released to HMEP grantees and included in 1998 edition of Guidelines for Public Sector Hazardous Materials Training.

Prevention Curriculum Workteam

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* Unable to attend September 29-30, 1996, workplan meeting

Approximately five additional team members have been recommended for special competency areas. Names of these additional team members will be provided in subsequent reports.

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Guidelines for Public Sector Hazardous Materials Training

Introduction

The Hazardous Materials Transportation Act (HMTA), as modified by the Hazardous Materials Uniform Safety Act (HMTUSA) of 1990, Section 117A, authorized the Department of Transportation (DOT) to make grants available to States, Territories, and Indian Tribes to conduct training of public sector employees who respond to emergencies (responders). DOT is also authorized to make grants available to States to develop improved hazardous materials emergency response plans. (Throughout this document, "State" will be understood to include also Territories and Indian Tribes.) To achieve these legislated responsibilities, DOT has established the Hazardous Materials Emergency Preparedness (HMEP) Grant Program.

HMTUSA, Section 117A, also authorized DOT to develop a curriculum to accompany the training grant program that (1) functions as a tool for State self-assessment that courses funded comply with curriculum, (2) supports State self-determination of a national "list of courses," and (3) ensures that public sector employees can safely and efficiently respond to hazardous materials emergencies. Based on extensive interagency analysis and discussion, the curriculum referred to in HMTUSA, Section 117A, has been interpreted as a coordinated program that will improve the quality and comprehensiveness of hazardous materials training. The fundamental principle of this approach is that management and quality control of training are the responsibility and authority of localities as well as States, Territories, and Indian Tribes. The Federal role is to provide support and assistance to State, Tribal, and local training management in curriculum development and revision and to help improve the quality of training delivery.

The HMEP curriculum effort includes (1) the development and maintenance of guidelines against which courses can be assessed by State, Tribal, Territory and local training managers and (2) the implementation and maintenance of support systems to help State, Tribal, Territory and local training offices improve key elements that affect the quality of training, such as needs assessment, training plan development, testing, and assimilation of existing courses and materials from other jurisdictions.

This document, Guidelines for Public Sector Hazardous Materials Training (Guidelines), constitutes one component of the overall program to provide assistance and support to State, Tribal, Territory and local hazardous materials training initiatives. This material has been developed by an author team of Federal, State, Tribal, Territory and local public sector training, planning, and response organizations and from a cross-section of professional associations involved in hazardous materials planning and response. The work has been conducted under the oversight of the Federal agencies in the HMEP Interagency Coordinating Group and has been coordinated by the Emergency Management Institute (EMI), Federal Emergency Management Agency (FEMA), under an interagency agreement with DOT.

Background

This initiative originated in the Federal Government's effort to address the problem of solid waste in general and hazardous waste in particular. The effort was first addressed by the Resource conservation and Recovery Act (RCRA) of 1976, which regulates disposal of both solid and hazardous wastes. In 1980, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) was passed to protect public health from hazardous waste. As additional information became available regarding health and safety issues, the 1986 Superfund Amendments and Reauthorization Act (SARA) Title I, Section 126(a)(b)(c), was enacted to require the Occupational Safety and Health Administration (OSHA) to develop standards for health and safety. This in turn led to the Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120 (1989), also referred to as OSHA 1910.120.

OSHA 1910.120 describes minimum levels of emergency responder skills, knowledge, and functional levels to meet the safety and health needs of emergency response personnel for both RCRA/CERCLA sites and response off-site. To further define these areas, the National Fire Protection Association (NFPA) developed a standard to define competencies for personnel responding to hazardous materials emergencies. This document is known as NFPA 472. The levels of training recommended in the most recent (1997) edition of NFPA 472 exceed the minimum levels required by OSHA. However, the basic principle that effective response is based on the competency of the responders, not on the number of training hours experienced, is fully shared.

The effort to better define training requirements that would lead to full competency of public sector responders was continued in HMTUSA Section 117A, which provided the impetus to develop Guidelines. In this document, the scope of personnel for whom training needs are defined is expanded from those participating in incident response to include those involved in planning for the response. In the response section, the Guidelines also bridges technical differences between current editions of OSHA and NFPA definitions of response competencies. The measurement of courses is expanded from length of training and general competencies to the identification of specific objectives and how student competency is measured.

In the Guidelines, the terms hazardous substances, hazardous materials, hazardous chemicals, and hazardous waste are considered interchangeable. The focus is on the general reduction of releases and exposures as well as on the general improvement of public sector response and planning, and the material is intended to support, without preference, various Federal agency requirements and terminologies. The Guidelines is written for hazardous materials training managers. It assumes that users are experienced in hazardous materials training; are familiar with OSHA 1910.120, NFPA 472, and the challenges of training program management; and have the ability in their organization to evaluate their hazard analysis and response capability as well as training requirements.

Managing Hazardous Materials Training

Managing hazardous materials training at the State and local levels is a complex task. The challenge is to conduct training with limited resources that meets the public sector response training requirements of OSHA 1910.120(q) and EPA (Environmental Protection Agency) 40 CFR 311 (EPA 311). This challenge is compounded by the additional responsibility to ensure that all public sector employees involved in planning and prevention are properly trained to perform their roles. The tasks the public sector should perform to meet these training responsibilities include:

- Ensure that proper hazard and vulnerability analyses are conducted to determine response and planning needs;
- Determine public sector employee roles and competency needs in planning and response;
- Conduct training needs assessments to establish and prioritize employee needs for competency and refresher training;
- Develop short- and long-term training plans that address the training needs for compliance with OSHA 1910.120(q) and EPA 311;
- Manage the jurisdiction's training curriculum for planning and response, including assessing courses for proper objectives, content, and methodology, and revising, updating, and developing courses to meet training requirements not presently addressed; and
- Ensure that the training delivery is effective.

Guidelines for Public Sector Hazardous Materials Training is intended to be a reference manual to assist training managers and public sector employers in accomplishing these tasks.

This Manual

The Guidelines is designed to be used as a working reference manual by public sector managers of hazardous materials training. It is organized and indexed to facilitate user cross-referencing of sections and content. Most material addresses the content of courses and the tools to be used in self-assessment of courses. However, course content constitutes only one factor in the training equation that determines the competency of public sector employees involved in hazardous materials planning and response. Therefore, Guidelines provides additional supportive information and guidance for the public sector training management responsibilities described above.

The Guidelines is organized into four components:

- Introduction
- Hazardous Materials Incident Response Curriculum Guidelines
- Hazardous Materials Planning Curriculum Guidelines
- Guidelines for Hazardous Materials Training Program Management

The second and third components describe in detail the recommended and the required substance of training courses for planning and response. The information consists primarily of competency requirements to be addressed. Objectives are organized by the pubic sector planning and response functions for which training should be conducted. Included are recommendations for the organization and structure of courses in each specific area, including considerations such as length of training, course methodology, exercise and activity design, equipment and facilities needed, topic-specific testing and evaluation considerations.

The training objectives in each topic area also are organized and coded to support self-assessment of courses by State, Tribal, Territory and local public sector employers and training managers. Instructions for self-assessment of courses are included in the Guidelines for Hazardous Materials Training Program Management, which is described below.

Hazardous Materials Incident Response Curriculum Guidelines

There are two tracks of objectives in each training category of the Hazardous Materials Incident Response Curriculum Guidelines. The first track, required training, describes minimum training requirements as defined by OSHA 19010.120(q). The second track, recommended training, recommends training objectives that reflect the training organization described in the NFPA 472 and 473 standards and other training recommendations incorporated by or developed by the national author team. Both tracks describe training levels that are the minimum training appropriate for the competencies in each section. They can be expanded by individual jurisdictions to better ensure effectiveness of training. Directions for self-assessment of courses (in the third component of the Guidelines) are provided for both required and recommended training tracks.

The Hazardous Materials Incident Response Guidelines are organized into the following subsections:

- General Training Issues-Incident Response
- First Responder Awareness
- First Responder Operations
- Hazardous Materials Technician
- On-Scene Incident Commander
- Hazardous Materials Branch Officer
- Safety Officer at Hazardous Materials Incidents (including Hazardous Materials Branch Safety Officer)
- Hazardous Materials Specialist (OSHA) with Private Sector Specialist Employee A and Technician Specialties: Tank Car, Cargo Tank, Intermodal Tank (NFPA)
- Specialist Employee (OSHA) with Private Sector Specialist Employee B and C (NFPA)
- Emergency Medical Services Level 1
- Emergency Medical Services Level 2
- Hospital Emergency Room Personnel
- Special Topics
- Hazardous Materials Related Standards

Hazardous Materials Planning Curriculum Guidelines

The goal of the Planning Curriculum Guidelines is to enhance the knowledge, skills, and attitudes of the broad spectrum of State, Tribal, Territory and local training audiences who develop or contribute to the development of local hazardous materials response plans. The curriculum is structured into three training levels based on general skill requirements of the training audience: Planning Orientation, Planning Essentials, and Planning Specialities. Planning Orientation focuses on general awareness of the planning requirements and process and is targeted for general audiences. Planning Essentials focuses on the minimum competencies needed to develop local response plans and is targeted for local planning team members. Planning Specialties focuses on advanced, specialized planning skills that are needed by selected personnel at

the State, Tribal, Territory and local levels to provide specialized roles and services in the planning process.

The Planning Curriculum Guidelines are organized into the following subsections:

- General Training Issues-Planning and Prevention
- Planning Orientation
- Planning Essentials
- Planning Specialities
    - Commodity Flow Study
    - Capability Assessment
    - Planning for Protective Actions
    - Plan Implementation and Maintenance
    - Facility Planning
    - Planning for Public Education
- Appendix A: Planning Guide Summaries
- Appendix B: Planning Models
- Appendix C: National Response Team's Integrated Contingency Plan Guidance

Guidelines for Hazardous Materials Training Program Management

This section contains tools to assist public sector training managers and employers in managing hazardous materials training programs. This section provides a model needs assessment approach that incorporates and supports existing State approaches to needs assessment, and provides directions and worksheets for assessment of response and planning courses using the response and planning section of the Guidelines. The Training Program Management Guidance is organized into the following seven sections:

- Training Needs Assessment
- Directions for Response Course Assessment
- Response Course Assessment Worksheets
- Response Objectives Assessment Worksheets
- Directions for Planning Course Assessment
- Planning Course Assessment Worksheets
- Planning Objectives Assessment Worksheets

Hazardous Materials Emergency Preparedness Grant Program

GUIDELINES FOR PUBLIC SECTOR HAZARDOUS MATERIALS TRAINING

March 1998

This document is provided as a resource for hazardous materials training, as part of the public service collaboration of the Federal Emergency Management Agency and the U.S. Department of Transportation under the Hazardous Materials Emergency Preparedness Grant Program. By mandate, this material is under continuing review and revision and is constantly updated to reflect changes in the field of hazardous materials. The most current edition is the internet version located on the HMEP internet site. Hardcopy versions such as this are periodically printed and distributed for the convenience of users. Successive hardcopy versions are distinguishable by date and, to better reflect the requirement that the material is under constant revision, hardcopy versions are often referred to as draft.

GUIDELINES FOR PUBLIC SECTOR HAZARDOUS MATERIALS TRAINING

March 1998

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Copies of this document are available at no cost to members of the hazardous materials planning and response community. In addition, we would greatly appreciate any input or suggestions for revisions. Every effort will be made to accommodate feedback received regarding this material. To order copies or provide feedback, please use the contact information below.

HMEP internet site:	URL address *http://www.fema.gov/emi/hmep*
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Guidelines for Public Sector Hazardous Materials Training

Introduction

The Hazardous Materials Transportation Act (HMTA), as modified by the Hazardous Materials Uniform Safety Act (HMTUSA) of 1990, Section 117A, authorized the Department of Transportation (DOT) to make grants available to States, Territories, and Indian Tribes to conduct training of public sector employees who respond to emergencies (responders). DOT is also authorized to make grants available to States to develop improved hazardous materials emergency response plans. (Throughout this document, "State" will be understood to include also Territories and Indian Tribes.) To achieve these legislated responsibilities, DOT has established the Hazardous Materials Emergency Preparedness (HMEP) Grant Program. HMTUSA, Section 117A, also authorized DOT to develop a curriculum to accompany the training grant program that (1) functions as a tool for State self-assessment that courses funded comply with curriculum, (2) supports State self-determination of a national "list of courses," and (3) ensures that public sector employees can safely and efficiently respond to hazardous materials emergencies. Based on extensive interagency analysis and discussion, the curriculum referred to in HMTUSA, Section 117A, has been interpreted as a coordinated program that will improve the quality and comprehensiveness of hazardous materials training. The fundamental principle of this approach is that management and quality control of training are the responsibility and authority of localities as well as States, Territories, and Indian Tribes. The Federal role is to provide support and assistance to State, Tribal, and local training management in curriculum development and revision and to help improve the quality of training delivery.

The HMEP curriculum effort includes (1) the development and maintenance of guidelines against which courses can be assessed by State, Tribal, Territory and local training managers and (2) the implementation and maintenance of support systems to help State, Tribal, Territory and local training offices improve key elements that affect the quality of training, such as needs assessment, training plan development, testing, and assimilation of existing courses and materials from other jurisdictions.

This document, *Guidelines for Public Sector Hazardous Materials Training (Guidelines)*, constitutes one component of the overall program to provide assistance and support to State, Tribal, Territory and local hazardous materials training initiatives. This material has been developed by an author team of Federal, State, Tribal, Territory and local public sector training, planning, and response organizations and from a cross-section of professional associations involved in hazardous materials planning and response. The work has been conducted under the oversight of the Federal agencies in the HMEP Interagency Coordinating Group and has been coordinated by the Emergency Management Institute (EMI), Federal Emergency Management Agency (FEMA), under an interagency agreement with DOT.

Background

This initiative originated in the Federal Government's effort to address the problem of solid waste in general and hazardous waste in particular. The effort was first addressed by the Resource conservation and Recovery Act (RCRA) of 1976, which regulates disposal of both solid and hazardous wastes. In 1980, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) was passed to protect public health from hazardous waste. As additional information became available regarding health and safety issues, the 1986 Superfund Amendments and Reauthorization Act (SARA) Title I, Section 126(a)(b)(c), was enacted to require the Occupational Safety and Health Administration (OSHA) to develop standards for health and safety. This in turn led to the Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120 (1989), also referred to as OSHA 1910.120.

OSHA 1910.120 describes minimum levels of emergency responder skills, knowledge, and functional levels to meet the safety and health needs of emergency response personnel for both RCRA/CERCLA sites and response off-site. To further define these areas, the National Fire Protection Association (NFPA) developed a standard to define competencies for personnel responding to hazardous materials emergencies. This document is known as NFPA 472. The levels of training recommended in the most recent (1997) edition of NFPA 472 exceed the minimum levels required by OSHA. However, the basic principle that effective response is based on the competency of the responders, not on the number of training hours experienced, is fully shared.

The effort to better define training requirements that would lead to full competency of public sector responders was continued in HMTUSA Section 117A, which provided the impetus to develop *Guidelines*. In this document, the scope of personnel for whom training needs are defined is expanded from those participating in incident response to include those involved in planning for the response. In the response section, the *Guidelines* also bridges technical differences between current editions of OSHA and NFPA definitions of response competencies. The measurement of courses is expanded from length of training and general competencies to the identification of specific objectives and how student competency is measured.

In the *Guidelines*, the terms hazardous substances, hazardous materials, hazardous chemicals, and hazardous waste are considered interchangeable. The focus is on the general reduction of releases and exposures as well as on the general improvement of public sector response and planning, and the material is intended to support, without preference, various Federal agency requirements and terminologies. The *Guidelines* is written for hazardous materials training managers. It assumes that users are experienced in hazardous materials training; are familiar with OSHA 1910.120, NFPA 472, and the challenges of training program management; and have the ability in their organization to evaluate their hazard analysis and response capability as well as training requirements.

Managing Hazardous Materials Training

Managing hazardous materials training at the State and local levels is a complex task. The challenge is to conduct training with limited resources that meets the public sector response training requirements of OSHA 1910.120(q) and EPA (Environmental Protection Agency) 40 CFR 311 (EPA 311). This challenge is compounded by the additional responsibility to ensure that all public sector employees involved in planning and prevention are properly trained to perform their roles. The tasks the public sector should perform to meet these training responsibilities include:

- Ensure that proper hazard and vulnerability analyses are conducted to determine response and planning needs;
- Determine public sector employee roles and competency needs in planning and response;
- Conduct training needs assessments to establish and prioritize employee needs for competency and refresher training;

- Develop short- and long-term training plans that address the training needs for compliance with OSHA 1910.120(q) and EPA 311;
- Manage the jurisdiction's training curriculum for planning and response, including assessing courses for proper objectives, content, and methodology, and revising, updating, and developing courses to meet training requirements not presently addressed; and
- Ensure that the training delivery is effective.

Guidelines for Public Sector Hazardous Materials Training is intended to be a reference manual to assist training managers and public sector employers in accomplishing these tasks.

This Manual

The *Guidelines* is designed to be used as a working reference manual by public sector managers of hazardous materials training. It is organized and indexed to facilitate user cross-referencing of sections and content. Most material addresses the content of courses and the tools to be used in self-assessment of courses. However, course content constitutes only one factor in the training equation that determines the competency of public sector employees involved in hazardous materials planning and response. Therefore, *Guidelines* provides additional supportive information and guidance for the public sector training management responsibilities described above.

The *Guidelines* is organized into four components:

- Introduction
- Hazardous Materials Incident Response Curriculum Guidelines
- Hazardous Materials Planning Curriculum Guidelines
- Guidelines for Hazardous Materials Training Program Management

The second and third components describe in detail the recommended and the required substance of training courses for planning and response. The information consists primarily of competency requirements to be addressed. Objectives are organized by the pubic sector planning and response functions for which training should be conducted. Included are recommendations for the organization and structure of courses in each specific area, including considerations such as length of training, course methodology, exercise and activity design, equipment and facilities needed, topic-specific testing and evaluation considerations.

The training objectives in each topic area also are organized and coded to support self-assessment of courses by State, Tribal, Territory and local public sector employers and training managers. Instructions for self-assessment of courses are included in the Guidelines for Hazardous Materials Training Program Management, which is described below.

Hazardous Materials Incident Response Curriculum Guidelines

There are two tracks of objectives in each training category of the Hazardous Materials Incident Response Curriculum Guidelines. The first track, *required training*, describes minimum training requirements as defined by OSHA 19010.120(q). The second track, *recommended training*, recommends training objectives that reflect the training organization described in the NFPA 472 and 473 standards and other training recommendations incorporated by or developed by the national author team. Both tracks describe training levels that are the *minimum* training appropriate for the competencies in each section. They can be expanded by individual jurisdictions to better ensure effectiveness of training. Directions for self-assessment of courses (in the third component of the *Guidelines*) are provided for both required and recommended training tracks.

The Hazardous Materials Incident Response Guidelines are organized into the following subsections:

- General Training Issues-Incident Response
- First Responder Awareness
- First Responder Operations
- Hazardous Materials Technician
- On-Scene Incident Commander
- Hazardous Materials Branch Officer
- Safety Officer at Hazardous Materials Incidents (including Hazardous Materials Branch Safety Officer)
- Hazardous Materials Specialist (OSHA) with Private Sector Specialist Employee A and Technician Specialties: Tank Car, Cargo Tank, Intermodal Tank (NFPA)
- Specialist Employee (OSHA) with Private Sector Specialist Employee B and C (NFPA)
- Emergency Medical Services Level 1
- Emergency Medical Services Level 2
- Hospital Emergency Room Personnel
- Special Topics
- Hazardous Materials Related Standards

Hazardous Materials Planning Curriculum Guidelines

The goal of the Planning Curriculum Guidelines is to enhance the knowledge, skills, and attitudes of the broad spectrum of State, Tribal, Territory and local training audiences who develop or contribute to the development of local hazardous materials response plans. The curriculum is structured into three training levels based on general skill requirements of the training audience: Planning Orientation, Planning Essentials, and Planning Specialities. Planning Orientation focuses on general awareness of the planning requirements and process and is targeted for general audiences. Planning Essentials focuses on the minimum competencies needed to develop local response plans and is targeted for local planning team members. Planning Specialties focuses on advanced, specialized planning skills that are needed by selected personnel at the State, Tribal, Territory and local levels to provide specialized roles and services in the planning process.

The Planning Curriculum Guidelines are organized into the following subsections:

- General Training Issues-Planning and Prevention
- Planning Orientation
- Planning Essentials
- Planning Specialities
  - Commodity Flow Study
  - Capability Assessment
  - Planning for Protective Actions
  - Plan Implementation and Maintenance
  - Facility Planning
  - Planning for Public Education
- Appendix A: Planning Guide Summaries
- Appendix B: Planning Models
- Appendix C: National Response Team's Integrated Contingency Plan Guidance

Guidelines for Hazardous Materials Training Program Management

This section contains tools to assist public sector training managers and employers in managing hazardous materials training programs. This section provides a model needs assessment approach that incorporates and supports existing State approaches to needs assessment, and provides directions and worksheets for assessment of response and planning courses using the response and planning section of the *Guidelines.*

The Training Program Management Guidance is organized into the following seven sections:

- Training Needs Assessment
- Directions for Response Course Assessment
- Response Course Assessment Worksheets
- Response Objectives Assessment Worksheets
- Directions for Planning Course Assessment
- Planning Course Assessment Worksheets
- Planning Objectives Assessment Worksheets

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- Federal Contacts
- Grantee Contacts
- Hazmat Links

Hazmat Guide

Response Training Guidelines

The following documents are provided in *pdf* format.

Get Acrobat Reader Download the FREE Adobe Acrobat Reader.

Download the entire document:
Response Training Guidelines

Download a specific section:
Response Training Issues
First Responder Awareness
First Responder Operations
Hazardous Materials Technician
Incident Commander
Hazardous Materials Branch Officer
Safety Officer at Hazardous Materials Incidents
OSHA: Specialist and NFPA: Specialist Employee A, and Technician Specialties
OSHA: Specialist Employee and NFPA: Specialist Employee B, C
Emergency Medical Service (EMS) Responder Level 1
Emergency Medical Service (EMS) Responder Level 2
Hospital Personnel

Response Training Special Topics

Issues in Haz Mat Incident Recovery/Cleanup
The National Contingency Plan
Terrorism and Illicit Use of Hazardous Materials
Alternative Fuels
Carbon Monoxide Response
Clandestine Drug Lab Operations
Rural and Frontier HM Risk Management

Related Standards

Last Updated: May 4, 2000

Hazardous Materials Incident Response Curriculum Guidelines

About the Response Guidelines

The Hazardous Materials Incident Response Curriculum Guidelines (Response Guidelines) are provided to assist public sector training managers and employers to understand the requirements for training public sector response personnel. Existing regulatory requirements are defined, and additional recommendations are provided to help managers improve the quality and effectiveness of hazardous materials incident response training.

The Response Guidelines are organized into 14 sections. The first section addresses general response training issues and includes:

- Employer's legal responsibilities for training
- The challenge of training to competency
- Response competency definitions
- General methodology and testing considerations
- Refresher training
- Instructor qualifications

Sections 2 through 14 display the objectives to be addressed in training and achieved by public sector response trainees for each competency area or response role that a public sector employee may be required to perform during a hazardous materials incident. The competency area sections are:

- First Responder Awareness
- First Responder Operations
- Hazardous Materials Technician
- On-Scene Incident Commander
- Hazardous Materials Branch Officer
- Safety Officer at Hazardous Materials Incidents
- OSHA: Specialist and NFPA: Specialist Employee A and Technician Specialties
- OSHA: Specialist Employee and NFPA: Specialist Employees B,C
- Emergency Medical Services Level 1
- Emergency Medical Services Level 2
- Hospital Personnel
- Special Topics
- Related Standards

In each of these competency area sections, the minimum level of *required training* is defined by the specifications from OSHA 1910.120(q). In addition, a more extensive *recommended* level of training is defined primarily by the specifications from NFPA 472 and NFPA 473.

Additional training objectives have been added to the recommended level of training beyond those specified in NFPA 472 to address special topics such as radiological first responder, cleanup considerations, and skilled support personnel. Each topic and the rationale for the additional training objectives are discussed in the Special Topics section.

For all *recommended* training objectives in each competency area section, the source and relationship training *required* under OSHA 1910.120(q) are given. The relationship of *recommended* objectives to regulatory requirements is provided to assist in assessing courses for compliance.

Directions for using this material to assess courses and support overall planning of training programs are provided in the Guidelines for Hazardous Materials Program Management section.

Hazardous Materials

Incident Response

General Training Issues

General Training Issues

The Need to Train

Public sector employees who respond to hazardous materials emergencies must be properly trained to perform their jobs safely and efficiently. Their employers are responsible for ensuring the health and safety of the responding personnel as well as the protection of the public and the communities served.

Public sector training managers face a significant challenge in ensuring that all responding personnel are fully trained and prepared, while working within existing limited resources and conflicting priorities. Their challenge is compounded by many other factors that affect the competency of public sector personnel to respond. These factors include individual retention differences and various needs for refresher training; the changing and complex nature of the hazardous materials threat; evolving incident strategies and operational techniques; and unpredictable team, expertise, and resource combinations during incident response.

Employer's Legal Responsibilities

OSHA 29 CFR 1910.120(q) and EPA 40 CFR 311 (EPA 311) require that emergency response employees be completely trained before they perform in emergencies. At a minimum, such training should include the elements of the emergency response plan, standard operating procedure (SOP's) established by the employer, and procedures for notification and handling of emergency incidents.

The employer must certify annually that each employee has successfully completed the required training. The method used to demonstrate competency for certification of training must be recorded and maintained by the employer. Important concepts to remember are:

- The chief or director is responsible for determining the appropriate level of training required based on actions required of members as stated in the SOP's.
- The chief or director is responsible for implementing the required training or certifying that members of the organization have the competencies required. Documentation of training is critical.
- OSHA 1910.120(q) rules apply to all individuals and agencies that are expected to respond to an emergency involving hazardous materials, that is, career or volunteer, fire, emergency medical services (EMS), or law enforcement personnel.

OSHA 1910.120(q) and EPA 311 apply to employers whose employees are engaged in emergency response to hazardous materials incidents. Employer responsibilities under these regulations fall into four primary areas:

- Development of an emergency response plan
- Development of specific procedures for handling hazardous materials incidents
- Training requirements
- Health and safety requirements (medical monitoring for the use of chemical protective clothing and exposure records)

Employers' Training Requirements

Employers must ensure that employees receive training in emergency response to hazardous materials incidents, based on their expected duties and functions. Such training must be performed before employees are permitted to perform in emergencies.

- An employer is responsible for determining the appropriate level of training required, based on actions expected of employees as stated in the agency's SOP's.

- An employer is responsible for implementing the required training. Emphasis should be on achieving the required competencies for the appropriate level of response rather than on minimal requirements for length of training.
- An employer is responsible for selecting qualified, competent instructors.
- An employer must provide annual refresher training sufficient to maintain competencies, or employees must demonstrate required competencies annually.
- An employer must maintain a record of demonstrated competencies including an explanation of how each competency was demonstrated. Training records must contain dates of training, student rosters, curriculum outlines, demonstration checklists or performance records and evaluation tools, and scores, if appropriate.

The Challenge of Competency

As part of a comprehensive program to protect the public and the environment from chemical incidents resulting from such occurrences as transportation accidents, spills, and discharges from industrial operations, training must be conducted for personnel who address planning, safety, response, and technical programs. Many personnel needing training related to hazardous materials are volunteers or part-time employees. Maintaining minimum competency levels for full-time paid staff may be difficult, but training part-time or volunteer responders is an even bigger challenge. Two of the most significant challenges are determining what constitutes a minimal level and ensuring minimal requirements are met. Another challenge is presented by part-time and volunteer responders' time constraints and limited flexibility to attend training.

There continues to be a great need for awareness-level training among the target audience. There may be thousands of employees in a State who require at least awareness-level training. No single generic course can fit the needs of all elements of the target audience. Although there are basic competencies, trainers must adjust material to suit police, fire, emergency medical service (EMS), public works, transportation, sanitation employees, and so forth. Training options must be offered accordingly, given these variations of need.

OSHA has defined the *minimum* number of hours for training at operations, technician, specialist, and incident commander levels. However, each employer is responsible for employees being trained to competency, and agencies often exceed the minimum hours of training to teach and test for competencies at the levels outlined by OSHA. The training needed to reach competency depends on the preexisting skills and experience of the trainees. Agencies frequently discover that training needs exceed the minimum required hours. On the other hand, employees of a response agency who have sufficient skills and experience may require minimal time to attain the competency level desired. An effective response is based on the competency of the responders, not the number of their training hours. At a minimum, employers should evaluate the amount of learning that resulted from the instruction.

OSHA is concerned that the knowledge and skills gained during initial hazardous materials training will be lost if refresher training is not provided. OSHA realizes that it will not take as many hours to cover the information in a review as during the initial presentation; therefore, there is no hour requirement for refresher training. It is up to the employer to determine that employees maintain their original competencies through refresher training. If it is determined that employees maintain their competency without refresher training, OSHA allows them to demonstrate this annually. If the employer decides to use demonstrated competencies instead of providing training, the employer must document how each employee demonstrated competency.

Competency Definitions

First Responder Awareness Level

First responders at the awareness level are those individuals who are likely to witness or discover a release of hazardous materials and are trained to initiate an emergency response sequence. No hourly training requirement is listed in either OSHA 1910.120 or NFPA 472, but these documents indicate that first responders must have sufficient training or experience to demonstrate competency in the following areas:

- An understanding of what hazardous materials are and the associated risks
- An understanding of potential outcomes when hazardous materials are present
- The ability to recognize the presence of hazardous materials
- An understanding of the first responder's role and use of the North American Emergency Response Guidebook
- The ability to recognize the need for additional resources and the knowledge of the procedures to make the appropriate notifications

First Responder Operations Level

OSHA minimum requirement = awareness + 8 hours at operations level (24 hours operations level training is required as a prerequisite to technician and/or incident commander training)

First responders at the operations level are those individuals who respond to releases or potential releases, as part of the initial response to protect people, property, and the environment. Operations-level first responders are trained to take defensive actions rather than try to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. OSHA 1910.120 requires that first responders at the operations level receive at least 8 hours of training or have sufficient experience to demonstrate competencies objectively. First responders must have the knowledge of the awareness level, and they are required to :

- Know basic hazard and risk assessment
- Know how to select and use protective equipment provided to the first responder
- Understand basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of their resources and protective equipment
- Know basic decontamination procedures
- Understand relevant SOP's and termination procedures

Hazardous Materials Technician

OSHA minimum requirement= 24 hours at operations level + technician training

Hazardous materials technicians are those who respond to releases or potential releases for the purpose of stopping the release. This level requires at least 24 hours of training at the operations level, training equal to the competencies at the technician level, and certification by the employer. Hazardous materials technicians assume a more aggressive role than first responders at the operations level. They approach the point of release to plug, patch, or otherwise stop the release of a hazardous substance. They must be trained at the first responder operations level, and they are required to:

- Know how to implement the employer's emergency response plan
- Know how to identify materials by using field survey instruments
- Be able to function in an assigned role in the incident command system
- Know how to select and use specialized personal protective equipment
- Understand hazard and risk assessment techniques
- Be able to perform advanced control and containment operations within the resources and equipment available
- Understand and implement decontamination procedures

On Scene Incident Commander

OSHA minimum requirement= 24 hours at operations level + incident commander training

Incident commanders who assume control of the incident scene beyond the first responder awareness level should receive at least 24 hours of training equal to the first responder operations level. In addition, the employer must certify that personnel in this position:

- Are able to implement the employer's incident command system
- Are able to implement the employer's emergency response plan
- Understand the risks associated with working in chemical protective clothing
- Know how to implement the local emergency response plan
- Know of the State emergency response plan and the Federal regional response team
- Understand the importance of decontamination

Hazardous Materials Branch Officer

The hazardous materials branch officer is that person who is responsible for directing and coordinating all operations assigned to the hazardous material branch by the incident commander. This function is akin to that of hazardous materials team leader and encompasses both the general command functions at the branch chief level in an incident command system and in addition includes the responsibility for technical and tactical leadership of the team of hazardous materials technicians at the incident. While the function of hazardous materials branch officer is not directly specified in OSHA 1910.120 or EPA 311, the branch officer function is a natural derivative of the incident command system requirements and incident commander delegation options which are themselves specified as required under the OSHA and EPA regulations for hazardous materials incident response. NFPA 472, Chapter 7: Competencies for Hazardous Materials Branch Officer include:

- Analyzing the incident
- Planning the response
- Implementing the response
- Reporting and documenting the hazardous materials incident

Safety Officer at Hazardous Materials Incidents and Hazardous Materials Branch Safety Officer

SAFETY OFFICER AT HAZARDOUS MATERIALS INCIDENTS

OSHA 29 CFR 1910.120(q)(3)(vii-viii) specifies certain performance and competency requirements for the safety officer at hazardous materials incidents, and employers are required to ensure that employees demonstrate competency in the skills defined. Although the safety officer was initially defined in OSHA as advising the incident commander only, subsequent OSHA interpretations acknowledge that there may be multiple safety officers at the incident scene, advising to several levels of command. OSHA competencies include:

- Identify and evaluate hazards, and assist in developing a safe response plan
- Identify and evaluate unsafe operations, activities, and/or conditions
- Identify appropriate interventions and coordinate with incident commander

HAZARDOUS MATERIALS BRANCH SAFETY OFFICER

NFPA 472, Chapter 8: Competencies for Hazardous Materials Branch Safety Officer defines the hazardous materials branch safety officer as that person who works within an incident command system (also called an incident management system) to ensure that recognized safe practices are followed within the hazardous materials branch. The hazardous materials branch safety officer will be called upon to provide technical advice or assistance regarding safety issues to the hazardous materials branch officer and incident safety officer at a hazardous materials incident. Competencies include:

- Analyzing the incident
- Assisting in developing a safe response plan
- Assisting in implementing the response plan safely
- Evaluating the response for safety problems and identifying needed interventions

OSHA: Specialist Employee/NFPA: Specialist Employee B,C

Specialist employees are defined by OSHA 1910.120(q)(5) as persons who, in the course of their regular job duties, work with and are trained in the handling of specific hazardous substances or chemical-carrying containers and are also prepared to provide advice or assistance within their area of expertise to an incident commander of the hazardous materials team at a hazardous materials incident. Advice and assistance may include gathering, recording, and analyzing information as well as guidance regarding hazards and response options. Assistance also may include working as a technical adviser in the warm and hot zones, if the specialist employee is qualified to do so safely.

These specialist functions are addressed somewhat differently in the National Fire Protection Association Standard 472, as Private Sector Specialist Employee C and Private Sector Specialist Employee B. Private Sector Specialist Employees C are persons having training or educationally acquired expertise in a product, a container, a chemical process, or some procedure of importance to the mitigation of a hazardous materials incident. Private Sector Specialist Employees C may be asked to gather, record, and analyze information. They may serve as consultants and technical advisers to the incident commander or the hazardous materials team, or they may arrange for the provision of such assistance as necessary and related to their area of expertise. They are not expected to work in either the hot or warm zones of an incident area.

Private Sector Specialist Employees B meet the competencies of Private Sector Specialist Employees C and in addition are qualified to assist the response in the warm and hot zones of an incident area and are qualified to provide information on personal protective equipment, decontamination methods, and response evaluation.

OSHA: Specialist/NFPA: Specialist Employee A and Technician Specialties

Hazardous materials specialists is a defined response competency in OSHA 29 CFR 1910.120 (q)(6)(iv) but is not a defined competency category in NFPA 472, 1997 edition. However, there is a relationship between the OSHA Specialist competency and the competencies in NFPA 472, 1997 edition, for Private Sector Specialist Employee A and the Technician Specialties: Tank Car, Cargo Tank, and Intermodal Tank. For this reason, these competencies are grouped together in these Guidelines.

HAZARDOUS MATERIALS SPECIALIST
OSHA minimum requirement = 24 hours at technician level + specialist training

Hazardous materials specialist are those senior experienced responders who respond with, and provide support to, hazardous materials technicians. Their duties parallel those of hazardous materials technicians, but specialists are required to have more direct or specific knowledge of the various substances they may be called on to contain. They also act as senior leaders of hazardous materials teams and may act as site liaisons with Federal, State, and local government authorities with regard to site activities according to OSHA 1910.120. OSHA regulations also require that specialists should receive at least 24 hours of training equal to the technician level, and they must:

- Know how to implement the local emergency response plan
- Be able to use advanced survey instruments
- Have knowledge of the State emergency response plan
- Be able to select and use proper specialized protective equipment
- Understand in-depth hazard and risk assessment techniques
- Be able to perform specialized control and containment operations with the available equipment and resources
- Be able to implement decontamination
- Be able to develop a site safety and control plan
- Understand chemical, radiological, and toxicological terminology and behavior

PRIVATE SECTOR SPECIALIST EMPLOYEE A
NFPA 472, Chapter 6—(1997 Edition)

Those persons who are specifically trained to handle incidents involving chemicals or containers for chemicals used in their organization's area of specialization. Consistent with the organization's emergency response plan and standard operating procedures, the private sector specialist employee A shall be able to analyze an incident involving chemicals within their organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

TECHNICIAN WITH A TANK CAR SPECIALTY
NFPA 472, Chapter 9—(1997 Edition)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged tank cars, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

TECHNICIAN WITH A CARGO TANK SPECIALTY
NFPA 472, Chapter 10—(1997 Edition)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged cargo tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

TECHNICIAN WITH AN INTERMODAL TANK SPECIALTY
NFPA 472, Chapter 11—(1997 Edition)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged intermodal tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

EMS/Hazardous Materials Responder

Emergency medical services personnel at EMS Hazardous Materials (HM) Level 1 are those persons who, in the course of their normal duties, may be called on to perform patient care activities in the "cold zone" at a hazardous materials incident. The incident's cold zone is the area that contains the command post and other support functions. In other documents it may be referred to as the clean zone or support zone. The role of the EMS/HM Level 1 responder is to provide care *only* to those individuals who no longer pose a significant risk of secondary contamination (that is, a risk of contaminating others, including those providing care). EMS personnel at EMS/HM Level II are those persons who, in the course of their normal duties, may be called on to perform patient care activities in the "warm zone" (the area where personnel and equipment decontamination and hot zone support take place) at hazardous materials incidents. The EMS/HM Level II response personnel may provide care to individuals who still pose a significant risk of secondary contamination. In addition, personnel at this level should be able to coordinate EMS activities at a hazardous materials incident and provide medical support for hazardous materials response personnel.

EMS personnel responding to hazardous materials incidents should be trained and receive regular continuing education to maintain competency in four areas:

- Emergency medical technology
- Hazardous materials
- Special topics approved by the authority having jurisdiction
- The importance of decontamination and basic decontamination procedures

Hospital Personnel

Hospital emergency department personnel are persons who, in the course of there normal work activities, may be called upon to perform patient care and decontamination within the confines of the hospital. These personnel in the performance of their duties may be exposed to a significant risk of secondary contamination from the patients which they are charged to care for. In addition these personnel may be called upon to assist pre-hospital personnel requiring technical assistance in the area of patient decontamination.

Refresher Training

OSHA minimum requirement = annual refresher training or recertification for all levels

All public sector employees who may respond to hazardous materials emergencies must receive refresher training on an annual basis or have experience that ensures their competency to perform their roles safely and efficiently. Employers must certify on an annual basis that employees continue to meet the performance objectives as defined in OSHA 1910.120. This may be accomplished through refresher training or demonstration of competency.

Refresher training or competency retesting requirements vary for each of the response levels. In general, refresher training should include critical skills practice, technical information updates, and refinement of incident scene coordination through field exercises simulating emergencies. At a minimum, competency should be demonstrated in all refresher training for the skills directly affecting the safety of responding personnel. Minimum hours for annual refresher training for response personnel are not specified in OSHA 1910.120(q). However, in practice, many jurisdictions use the 8-hour minimum refresher training requirement for site workers in OSHA 1910.120(e) as a guide.

In each of the competency sections of the Response Guidelines, unique areas of emphasis for refresher training are noted.

Recommended Instructor Qualifications

OSHA 1910.120(q)(7) states: "Trainers who teach any of the above training subjects shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the U.S. National Fire Academy, or they shall have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach."

To implement the OSHA regulations and to encourage quality instruction, it is recommended that instructors possess the following:

- Job knowledge-thorough knowledge of the content to be taught; knowledge of how the information, techniques, and principles apply to performing the job; understanding the difficulties and problems that arise on the job; and specific training or education in the subject matter being taught
- Job Experience-actual work experience directly related to the subject matter (have performed that job being taught) and experience in hazardous materials incidents
- Training knowledge-successful completion of an instructor training course that covers the principles of learning, methods and sequencing of instruction, methods of testing and evaluation, preparing performance objectives and lesson plans, training liability (Reference: NFPA 1041), and oral and written communication skills
- Personal qualities-patience and understanding, enjoyment of and respect for students, and flexibility
- Sensitivity to cultural diversity among students

Some States and private organizations certify hazardous materials instructors. Professional organizations, such as NFPA, have established professional standards for instructors (NFPA 1041) that can be used to evaluate instructor training and certification. Employers and trainers should carefully examine the following criteria for certification of hazardous materials instructors.

- What standards have been applied?
- Are potential certified instructors tested in their area of subject matter expertise?
- Are candidates required to demonstrate their skills and knowledge in the classroom setting?
- Are there follow-up evaluations or rectification requirements?
- Are both instructional and technical skills addressed by certification?
- Is hands-on experience in hazardous materials response considered?
- Have the instructors performed the tasks being taught?

Hazardous Materials

Incident Response Training Guidelines

First Responder Awareness

General Training Considerations

Introduction

First responders at the awareness level shall be trained to meet all competencies of the awareness level. In addition, first responders at the awareness level shall receive training to meet requirements of the Occupational Safety and Health Administration, local occupational health and safety regulatory agencies, or Environmental Protection Agency, as appropriate for their jurisdictions. Members of any organization that respond or can be expected to respond to a hazardous materials incident must know the requirements of the OSHA 1910.120 and EPA 311 training and emergency response plan.

Definition

First responders at the awareness level are personnel who are likely to witness or discover a hazardous materials emergency or, in the course of their normal duties, may be the first persons on the scene of an emergency involving hazardous materials. First responders at the awareness level are expected to recognize that hazardous materials are present, protect themselves, call for trained personnel, and secure the area. The most important duty of these personnel is to make proper notification to begin the emergency response sequence. The first responders' role at this level should involve no potential for their exposure to the hazards related to an incident.

Audience

Hazardous materials responders at the awareness level may be employed by public- or private-sector organizations, such as fire or emergency medical services, law enforcement, emergency management, public works, public health, utilities, and transportation, as well as volunteer agencies and manufacturers, guard and security services, and contractors.

Methodology Recommendations

The training method can use a combination of lecture and media presentations with individual or small-group exercises at intervals of 30 to 45 minutes. A course can range from 4 to 16 hours in length. The exercises can consist of activities that practice identification and recognition of hazardous materials from scenario descriptions and can use information sources such as the North American Emergency Response Guidebook to establish the presence of the hazardous materials described in the scenarios.

Refresher training should focus on renewing the skill of employees in using information sources to recognize and identify hazardous materials.

Target Training to a Specific Occupational Group

Persons training for the awareness level are a diverse group, including police, fire, EMS, public works, emergency management, and transportation personnel. Although the minimal competencies for all personnel remain the same, whenever possible training should be tailored to meet the needs of specific groups. Trainees from a specific discipline or profession should be asked to respond to scenarios that are relevant to their work. They should play roles that are consistent with their occupational responsibilities. Training managers should recruit and train instructors from a variety of occupations. Training materials should depict awareness in multiple situations. Major changes to the curriculum should not be necessary; in most cases, an instructor simply must be sensitive to the audience and its needs and use realistic scenarios.

SUMMARY: First Responder at Awareness Level

Audience	*Prerequisites*	*Training*	*Refresher*

Very broad. All who may first respond to hazmat incidents.	None.	- No length required; 4-16 hours is common practice.
		- Traditional classroom format.
		- Competencies:
		  - Understanding of hazmat and the role of first responder.
		  - Ability to recognize and identify hazmat.
			Very broad. All who may first respond to hazmat incidents.

Federal Requirements
For First Responder Awareness Training

OSHA establishes the following training requirements for first responders at the awareness level. Length of training and method of testing are not specified, but employers are required to ensure the employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(i)
FIRST RESPONDER AWARENESS LEVEL

First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

(A) An understanding of what hazardous substances are, and the risks associated with them in an incident
(B) An understanding of the potential outcomes associated with an emergency created when hazardous substances are present
(C) The ability to recognize the presence of hazardous substances in an emergency
(D) The ability to identify the hazardous substance, if possible
(E) An understanding of the role the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook
(F) The ability to realize the need for additional resources, and to make appropriate notifications to the communications center.

Required Training can be translated directly into the following six sample principal objectives.

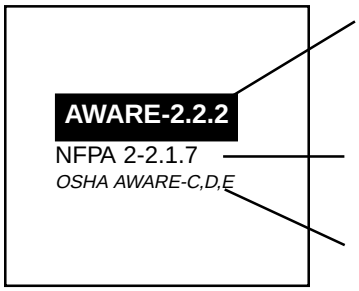
Identification	*Sample **Required** Training Objectives*
OSHA AWARE-A	Define the different types of hazardous substances and identify the risks associated with them in an incident.
OSHA AWARE-B	Given a simulated incident involving hazardous materials, identify the potential outcomes.
OSHA AWARE-C	Given the data available during an incident response, demonstrate recognition of the presence of hazardous substances.
OSHA AWARE-D	Given the data available during an incident response, identify hazardous substances present.
OSHA AWARE-E	Define the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the DOT Emergency Response Guidebook.
OSHA AWARE-F	Given a simulated incident, determine the need for additional resources, and make appropriate notifications to the communication center.

Recommended Training
For First Responder Awareness Training

The following training objectives are recommended for first responder awareness training. The primary source for this material is NFPA 472, Chapter 2: Competencies for First Responder Awareness Level. Training objectives from other sources are noted; the rationale for their inclusion is found in the Special Topics section at the end of the Response Guidelines.

In general, these objectives are comparable in scope to those minimally required by OSHA. They do not constitute an increased level of training but rather provide a greater definition of trainee objectives. To assist in assessing course compliance with OSHA 1910.120 (q), the relationships between these objectives and the OSHA requirements are noted. References to OSHA 1910.120 (q)(6)(i)(A through F) are abbreviated as OSHA AWARE-A through F.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as AWARE-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA 1910.120(q)(6)(i)(A-F) are abbreviated as AWARE-A-F.

Identification	***Recommended** Training Objectives*
AWARE-1 NFPA 2-1.3 *OSHA AWARE-C,D,E*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the first responder at the awareness level.
AWARE-1.1 NFPA 2-1.3(a) *OSHA AWARE-C,D,E*	Describe the responsibility to analyze the incident to determine both the hazardous materials present and the basic hazard and response information for each hazardous material.
AWARE-1.1.1 NFPA 2-1.3(a)1 *OSHA AWARE-C*	Identify the responsibility to detect the presence of hazardous materials
AWARE-1.1.2 NFPA 2-1.3(a)2 *OSHA AWARE-D*	Identify the responsibility to survey a hazardous materials incident from a safe location to identify the name, UN/NA identification number, or type placard applied for any hazardous materials involved
AWARE-1.1.3 NFPA 2-1.3(a)3 *OSHA AWARE-E*	Identify the responsibility to collect hazard information from the current edition of the *North American Emergency Response Guidebook*

AWARE-1.2 NFPA 2-1.3(b) *OSHA AWARE-E*	Describe the responsibility to implement actions consistent with the local emergency response plan, the organization's standard operating procedures, and the current edition of the *North American Emergency Response Guidebook* .
AWARE-1.2.1 NFPA 2-1.3(b)1 *OSHA AWARE-E*	Identify the responsibility to initiate protective actions
AWARE-1.2.2 NFPA 2-1.3(b)2 *OSHA AWARE-A,B,F*	Identify the responsibility to initiate the notification process

Analyzing the Incident
Detecting the Presence of Hazardous Materials.

AWARE-2 NFPA 2-2.1 *OSHA AWARE-A,B,C,D*	Given various facility or transportation situations, or both, with and without hazardous materials present, identify those situations where hazardous materials are present.
AWARE-2.1 NFPA 2-2.1.1 *OSHA AWARE-A*	Identify the definition of hazardous materials (or dangerous goods, in Canada).
AWARE-2.2 NFPA 2-2.1.2 *OSHA AWARE-A,E*	Identify the DOT hazard classes and divisions of hazardous materials and identify common examples of materials in each hazard class or division.
AWARE-2.3 NFPA 2-2.1.3 *OSHA AWARE-B,E*	Identify the primary hazards associated with each of the DOT hazard classes and divisions of hazardous materials by hazard class or division.
AWARE-2.4 NFPA 2-2.1.4 *OSHA AWARE-A,B*	Identify the difference between hazardous materials incidents and other emergencies.
AWARE-2.5 NFPA 2-2.1.5 *OSHA AWARE-C,D*	Identify typical occupancies and locations in the community where hazardous materials are manufactured, transported, stored, used, or disposed of.
AWARE-2.6 NFPA 2-2.1.6 *OSHA AWARE-C,D*	Identify typical container shapes that can indicate hazardous materials.
AWARE-2.7 NFPA 2-2.1.7 *OSHA AWARE-C,D,E*	Identify facility and transportation markings and colors that indicate hazardous materials, including: (a) UN/NA identification numbers; (b) NFPA 704 markings; (c) military hazardous materials markings; (d) special hazard communication markings; (e) pipeline markings; and (f) container markings.

AWARE-2.8
NFPA 2-2.1.8
OSHA AWARE-D

Given an NFPA 704 marking, describe the significance of the colors, numbers, and special symbols.

AWARE-2.9
NFPA 2-2.1.9
OSHA AWARE-D,E

Identify U.S. and Canadian placards and labels that indicate hazardous materials.

AWARE-2.10
NFPA 2-2.1.10
OSHA AWARE-B

Identify the basic information on material safety data sheets (MSDS) and shipping papers that indicates hazardous materials.

AWARE-2.10.1
NFPA 2-2.1.10.1
OSHA AWARE-B

Identify where to find material safety data sheets (MSDS).

AWARE-2.10.2
NFPA 2-2.1.10.2
OSHA AWARE-B

Identify entries on a material safety data sheet that indicate the presence of hazardous materials.

AWARE-2.10.3
NFPA 2-2.1.10.3
OSHA AWARE-B,C

Identify the entries on shipping papers that indicate the presence of hazardous materials.

AWARE-2.10.4
NFPA 2-2.1.10.4
OSHA AWARE-B,C

Match the name of the shipping papers found in transportation (air, highway, rail, and water) with the mode of transportation.

AWARE-2.10.5
NFPA 2-2.1.10.5
OSHA AWARE-B

Identify the person responsible for having the shipping papers in each mode of transportation.

AWARE-2.10.6
NFPA 2-2.1.10.6
OSHA AWARE-B

Identify where the shipping papers are found in each mode of transportation.

AWARE-2.10.7
NFPA 2-2.1.10.7
OSHA AWARE-B,C

Identify where the papers can be found in an emergency in each mode of transportation.

AWARE-2.11
NFPA 2-2.1.11
OSHA AWARE-C,E

Identify examples of clues (other than occupancy/location, container shape, markings/color, placards/labels, MSDS, and shipping papers) that use the senses of sight, sound, and odor to indicate hazardous materials.

AWARE-2.12
NFPA 2-2.1.12
OSHA AWARE-C

Describe the limitations of using the senses in determining the presence or absence of hazardous materials.

AWARE-2.13

NFPA 2-2.1.13
(See Special Topics: Terrorism)

Identify types of locations that may become targets for criminal or terrorist activity using hazardous materials.

The following are some examples of locations:

(a)Public assembly
(b)Public buildings
(c)Mass transit systems
(d)Places with high economic impact
(e)Telecommunications facilities
(f)Places with historical or symbolic significance

AWARE-2.14

NFPA 2-2.1.14
(See Special Topics: Terrorism)

Identify at least four indicators of possible criminal or terrorist activity involving hazardous materials.

The following are some examples of indicators:

(a)Hazardous materials or lab equipment that is not relevant to the occupancy
(b)Intentional release of hazardous materials
(c)Unexplained patterns of sudden onset illnesses or deaths
(d)Unusual odors or tastes
(e)Unexplained signs of skin, eye, or airway irritation
(f)Unusual security, locks, bars on windows, covered windows, and barbed wire
(g)Unexplained vapor clouds, mists, and plumes
(h)Patients twitching, tightness in chest, sweating, pin-point pupils (miosos), runny nose (rhinorrhea), and nausea and vomiting.

Analyzing the Incident

Surveying the Hazardous Materials Incident from a Safe Location

AWARE-3

NFPA 2-2.2
OSHA AWARE-D,E

Given examples of facility and transportation situations involving hazardous materials, identify the hazardous material(s) in each situation by name, UN/NA identification number, or type placard applied.

AWARE-3.1

NFPA 2-2.2.1
OSHA AWARE-D

Identify difficulties encountered in determining the specific names of hazardous materials in both facilities and transportation.

AWARE-3.2

Rad.1st Resp.
(See Special Topics)

Identify the significance of the terms “Type A,” “Type B,” and “Special Form” as they relate to radioactive material packaging.

AWARE-3.3

Rad. 1st Resp.
(See Special Topics)

Identify additional information concerning radionuclide identity and activity provided on radioactive material labels and shipping papers.

AWARE-3.4

Rad. 1st Resp.
(See Special Topics)

Identify additional information concerning physical and chemical form and packaging type provided on radioactive material shipping papers.

AWARE-3.5

NFPA 2-2.2.2
OSHA AWARE-D

Identify sources for obtaining the names of, UN/NA identification numbers for, or types of placard associated with hazardous materials in transportation.

AWARE-3.6
NFPA 2-2.2.3
OSHA AWARE-D

Identify sources for obtaining the names of hazardous materials in a facility.

Analyzing the Incident
Collecting Hazard Information

AWARE-4
NFPA 2-2.3
OSHA AWARE-A,B,E

Given the identity of various hazardous materials (name, UN/NA identification number, or type placard, identify the fire, explosion, and health hazard information for each material by using the current edition of the *North American Emergency Response Guidebook*.

AWARE-4.1
NFPA 2-2.3.1
OSHA AWARE-A,B,E

Identify the three methods for determining the appropriate guide page for a hazardous material.

AWARE-4.2
NFPA 2-2.3.2
OSHA AWARE-A,B,E

Identify the two general types of hazards found on each guide page.

AWARE-4.3
Rad. 1st Resp.
(See Special Topics)

Identify difficulties encountered in using the senses to recognize radioactive material releases and radiation.

Implementing the Response
Initiating Protective Actions

AWARE-5
NFPA 2-4.1
OSHA AWARE-E

Given examples of facility and transportation hazardous materials incidents, the local emergency response plan, the organization's standard operating procedures, and the current edition of the *North American Emergency Response Guidebook*, identify the actions to be taken to protect themselves and others and to control access to the scene.

AWARE-5.1
NFPA 2-4.1.1
OSHA AWARE-E

Identify the location of both the local emergency response plan and the organization's standard operating procedures.

AWARE-5.2
NFPA 2-4.1.2
OSHA AWARE-E,F

Identify the role of the first responder at the awareness level during a hazardous materials incident.

AWARE-5.3
NFPA 2-4.1.3
OSHA AWARE-E

Identify the basic precautions to be taken to protect themselves and others in a hazardous materials incident.

AWARE-5.3.1
Rad. 1st Resp.
(See Special Topics)

Identify circumstances involving radioactive material in transportation where actions should be initiated to protect the lives of accident victims through carrying out rescue and providing emergency medical care.

AWARE-5.3.2
NFPA 2-4.1.3.1
OSHA AWARE-E

Identify the precautions necessary when providing emergency medical care to victims of hazardous materials incidents.

AWARE-5.3.3
NFPA 2-4.1.3.2
OSHA AWARE-E

Identify typical ignition sources found at the scenes of hazardous materials incidents.

AWARE-5.3.4
NFPA 2-4.1.3.3
OSHA AWARE-A,B

Identify the ways hazardous materials are harmful to people, the environment, and property at hazardous materials incidents.

AWARE-5.3.5
NFPA 2-4.1.3.4
OSHA AWARE-A,B,C

Identify the general routes of entry for human exposure to hazardous materials.

AWARE-5.4
NFPA 2-4.1.4
OSHA AWARE-E

Given the identity of various hazardous materials (name, UN/NA identification number, or type placard), identify the following response information:
(a)Emergency action (fire, spill, or leak and first aid)
(b)Personal protective equipment necessary
(c)Initial isolation and protective action distances

AWARE-5.4.1
NFPA 2-4.1.4.1
OSHA AWARE-A,E

Given the name of a hazardous material, identify the recommended personal protective equipment from the following list:
(a)Street clothing and work uniforms
(b)Structural fire-fighting protective clothing
(c)Positive pressure self-contained breathing apparatus
(d)Chemical-protective clothing and equipment

AWARE-5.4.2
NFPA 2-4.1.4.2
OSHA AWARE-A,E

Identify the definitions for each of the following protective actions:
(a)Isolation of the hazard area and denial of entry
(b)Evacuation
(c)Sheltering in-place protection

AWARE-5.4.3
NFPA 2-4.1.4.3
OSHA AWARE-B,C,E

Identify the shapes of recommended initial isolation and protective action zones.

AWARE-5.4.4
NFPA 2-4.1.4.4
OSHA AWARE-B,C,E

Describe the difference between small and large spills as found in the table of Initial Isolation and Protective Action Distances.

AWARE-5.4.5
NFPA 2-4.1.4.5
OSHA AWARE-B,C,E

Identifying the circumstances under which the following distances are used at a hazardous materials incident:
(a)Table of initial isolation and protective action distances
(b)Isolation distances in the numbered guides

AWARE-5.4.6
NFPA 2-4.1.4.6
OSHA AWARE-B,C,E

Describe the difference between the isolation distances in the orange-bordered guide pages and the protective action distances in the green-bordered pages in the document.

AWARE-5.5
NFPA 2-4.1.5
OSHA AWARE-E

Identify the techniques used to isolate the hazard area and deny entry to unauthorized persons at hazardous materials incidents.

AWARE-5.6

NFPA 2-4.1.6
(See Special Topics: Terrorism)

Identify the specific actions necessary when an incident is suspected to involve criminal or terrorist activity.

The following are some examples of action:

(a)Communicate the suspicion during the notification process

(b)Isolate potentially exposed people

(c)Document the initial observation

(d)Attempt to preserve evidence while performing operational duties

Implementing the Response

Initiating the Notification Process

AWARE-6

NFPA 2-4.2
OSHA AWARE-E,F

Given either a facility or transportation scenario involving hazardous materials, with and without criminal or terrorist activities, identify the appropriate initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures.

Hazardous Materials

Incident Response Training Guidelines

First Responder Operations

General Training Considerations

Introduction

First responders at the operations level shall be trained to meet all requirements at the awareness and operational levels. In addition, first responders at the operations level shall receive training to meet requirements of OSHA, local occupational health and safety regulatory agencies, or EPA, as appropriate for their jurisdiction. (Source: NFPA 472)

Definition

First responders at the operations level are those persons who respond to releases or potential releases of hazardous materials as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They shall be trained to respond in a defensive fashion, to control the release from a safe distance and keep it from spreading. (Source: NFPA 472)

Audience

First responders at the operations level are typically those persons who are the first to arrive at the scene of a hazardous materials incident. They may be employed by law enforcement, public service, fire or emergency services, or a variety of private organizations. Generally, they are not members of a hazardous materials response team.

Methodology

First responder operations training is best conducted in a classroom environment, with opportunities for small- and large-group exercises either in the classroom or as a field exercise in conjunction with the training. Training ranges from 8 to 40 hours, and longer courses often include awareness training with the operations program. Lectures with small-group student activities are appropriate for much of the material. However, incident scene organization and command drill and practice will require large-group simulated incidents that can be best conducted in a simulator or as a field exercise.

Refresher training should include (1) competency retesting of all response skills, (2) technical information updates, and (3) critique of incident scene decision-making using simulated emergencies.

SUMMARY: First Responder at the Operations Level

OSHA minimum requirement = Awareness + 8 hours Operations training (24 hours operations training is required as a prerequisite to technician and/or incident commander training)

Audience	Prerequisites	Training	Refresher
Broad. All who may participate in initial operations at a hazmat incident.	First Responder Awareness training.	- 8-40 hours (minimum 8 required). - Classroom and simulator/field instruction. - Competencies: -Understanding of hazmat terms, basic hazard and risk assessment, and role of first responder at operational level. - Ability to perform basic control, containment and/or confinement techniques with proper use or personal protective equipment and following standard operating procedure. - Ability to implement basic decontamination procedures.	1. Competency retesting of all response skills. 2. Technical information updates. 3. Incident scene decision-making using simulated emergencies.

Federal Requirements

For First Responder Operations Training

OSHA establishes the following training requirements for first responders at the operations level: a minimum of 8 hours of training beyond the awareness level or, as an alternative, certification of sufficient experience. Training in excess of 8 hours may be necessary, especially for additional skills and knowledge such as for flammable gas firefighting. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(ii)
FIRST RESPONDER OPERATIONS LEVEL

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least 8 hours of training or have had sufficient experience to objectively demonstrate competency in the following areas, in addition to those listed for the awareness level and the employer shall so certify:

- *(A) Knowledge of the basic hazard and risk assessment techniques*
- *(B) Know how to select and use proper personal protective equipment provided to the first responder operational level*
- *(C) An understanding of basic hazardous materials terms*
- *(D) Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit*
- *(E) Know how to implement basic decontamination procedures*
- *(F) An understanding of the relevant standard operating procedures and termination procedures*

Required Training can be translated into the following six sample principal objectives.

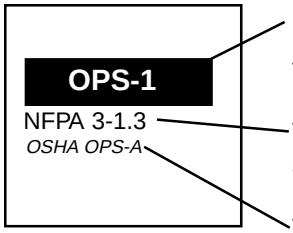
Identification	*Sample **Required** Training Objectives*
OSHA OPS-A	Given a simulated incident involving hazardous materials, demonstrate knowledge of basic hazard and risk assessment techniques.
OSHA OPS-B	Given a simulated incident involving hazardous materials, select and demonstrate correct use of proper personal protective equipment.
OSHA OPS-C	Define basic hazardous materials terms.
OSHA OPS-D	Given a simulated incident involving hazardous materials, describe basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available within the student's unit.
OSHA OPS-E	Given a simulated incident involving hazardous materials, list and define appropriate basic decontamination procedures.
OSHA OPS-F	Given a simulated incident involving hazardous materials, identify relevant SOP's and termination procedures.

Recommended Training

For First responder Operations Training

The following training objectives are recommended for first responder operations training. The primary source for this material is NFPA 472, Chapter 3: Competencies for the Responder at the Operational Level. Training objectives from other sources are so noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

The scope of training reflected in the recommended objectives exceeds those minimally required for the first responder at the operations level. The additional training recognizes the responsibility of the first responder to establish command using an incident management system at the beginning of the emergency. Therefore, several recommended objectives relate to OSHA requirements for incident commander in addition to OSHA requirements for first responder operations. To assist in assessing course compliance with OSHA 1910.120(q), the relationships between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as OPS 1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 29 CFR 1910.120(q)(6)(ii)(A-F) = OSHA OPS-A to F
OSHA 29 CFR 1910.120(q)(6)(i)(A-F) = OSHA AWARE-A to F
OSHA 29 CFR 1910.120(q)(6)(v)(A-F) = OSHA I.C.-A to F
OSHA 29 CFR 1910.120(q)(3)(i-ix) are subsumed under OSHA I.C.-A to F (see Incident Commander)

Identification	***Recommended** Training Objectives*
OPS-1 NFPA 3-1.3 *OSHA OPS-A* *OSHA AWARE-B*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the first responder at the operations level.
OPS-1.1 NFPA 3-1.3(a) *OSHA OPS-A* *OSHA AWARE-B*	Describe the responsibility to analyze a hazardous materials incident and determine the magnitude of the problem in terms of outcomes, and demonstrate the ability to do the following:
OPS-1.1.1 NFPA 3-1.3(a)1 *OSHA OPS-A* *OSHA AWARE-B*	Identify the responsibility to survey the hazardous materials incident to identify the containers and materials involved, determine whether hazardous materials have been released, and evaluate the surrounding conditions.
OPS-1.1.2 NFPA 3-1.3(a)2 *OSHA OPS-B*	Identify the responsibility to collect hazard and response information from material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and shipper/manufacturer contacts.

OPS-1.1.3 NFPA 3-1.3(a)3 *OSHA OPS-A* *OSHA AWARE-B*	Identify the responsibility to predict the likely behavior of a material as well as its container.
OPS-1.1.4 NFPA 3-1.3(a)4 *OSHA OPS-A* *OSHA AWARE-B*	Identify the responsibility to estimate the potential harm at a hazardous materials incident.
OPS-1.2 NFPA 3-1.3(b) *OSHA OPS-B,D*	Describe the responsibility to plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
OPS-1.2.1 NFPA 3-1.3(b)1 *OSHA OPS-A*	Identify the responsibility to describe the response objectives for hazardous materials incidents.
OPS-1.2.2 NFPA 3-1.3(b)2 *OSHA OPS-D*	Identify the responsibility to describe the defensive options available for a given response objective.
OPS-1.2.3 NFPA 3-1.3(b)3 *OSHA OPS-B*	Identify the responsibility to determine whether the personal protective equipment provided is appropriate for implementing each defensive option.
OPS-1.2.4 NFPA 3-1.3(b)4 *OSHA OPS-E*	Identify the responsibility to identify the emergency decontamination procedures.
OPS-1.3 NFPA 3-1.3(c) *OSHA OPS-B,D,F* *OSHA I.C.-A,B,D*	Describe the responsibility to implement the planned response to favorably change the outcomes consistent with the local emergency response plan and the organization's standard operating procedures.
OPS-1.3.1 NFPA 3-1.3(c)1 *OSHA OPS-F* *OSHA I.C.-B,D*	Identify the responsibility to establish and enforce scene control procedures including control zones, emergency decontamination, and communications.
OPS-1.3.2 NFPA 3-1.3(c)2 *OSHA I.C.-A*	Identify the responsibility to initiate an incident management system (IMS) for hazardous materials incidents.
OPS-1.3.3 NFPA 3-1.3(c)3 *OSHA OPS-B*	Identify the responsibility to don, work in, and doff personal protective equipment provided by the authority having jurisdiction.
OPS-1.3.4 NFPA 3-1.3(c)4 *OSHA OPS-D*	Identify the responsibility to perform defensive control functions identified in the plan of action.
OPS-1.4 NFPA 3-1.3(d) *OSHA OPS-D*	Describe the responsibility to evaluate the progress of the actions taken to ensure that the response objectives are being met safely, effectively, and efficiently.

OPS-1.4.1
NFPA 3-1.3(d)1
OSHA OPS-D

Identify the responsibility to evaluate the status of the defensive actions taken in accomplishing the response objectives.

OPS-1.4.2
NFPA 3-1.3(d)2
OSHA OPS-D

Identify the responsibility to communicate the status of the planned response

Analyzing the Incident
Surveying the Hazardous Materials Incident

OPS-2
NFPA 3-2.1
OSHA OPS-A
OSHA AWARE-B

Given examples of both facility and transportation scenarios involving hazardous materials, survey the incident to identify the containers and materials involved, determine whether hazardous materials have been released, and evaluate the surrounding conditions.

OPS-2.1
NFPA 3-2.1.1
OSHA OPS-A
OSHA AWARE-C

Given three (3) examples each of liquid, gas, and solid hazardous materials, identify the general shapes of containers in which the hazardous materials are typically found.

OPS-2.1.1
NFPA 3-2.1.1.1
OSHA OPS-A
OSHA AWARE-C

Given examples of the following tank cars, identify each tank car by type:
(a)Nonpressure tank cars with and without expansion domes
(b)Pressure tank cars
(c)Cryogenic liquid tank cars

OPS-2.1.2
NFPA 3-2.1.1.2
OSHA OPS-A
OSHA AWARE-C

Given examples of the following intermodal tank containers, identify each intermodal tank container by type:
(a)Nonpressure intermodal tank containers
(b)Pressure intermodal tank containers

OPS-2.1.3
NFPA 3-2.1.1.3
OSHA OPS-A
OSHA AWARE-C

Given examples of the following cargo tanks, identify each cargo tank by type:
(a)MC-306/DOT 406 cargo tanks
(b)MC-307/DOT-407 cargo tanks
(c)MC-312/DOT-412 cargo tanks
(d)MC-331 cargo tanks
(e)MC-338 cargo tanks
(f)Dry bulk cargo tanks

OPS-2.1.4
NFPA 3-2.1.1.4
OSHA OPS-A
OSHA AWARE-C

Given examples of the following facility tanks, identify each fixed facility tank by type:
(a)Nonpressure facility tanks
(b)Pressure facility tanks
(c)Cryogenic liquid tanks

OPS-2.1.5
NFPA 3-2.1.1.5
OSHA OPS-A
OSHA AWARE-C

Given examples of the following nonbulk packages, identify each package by type:
(a)Bags
(b)Carboys
(c)Cylinders
(d)Drums

OPS-2.2
NFPA 3-2.1.2
OSHA OPS-A

Given examples of facility and transportation containers, identify the markings that differentiate one container from another.

OPS-2.2.1
NFPA 3-2.1.2.1
OSHA OPS-A

Given examples of the following marked transport vehicles and their corresponding shipping papers, identify the vehicle or tank identification marking:
(a)Rail transport vehicles, including tank cars
(b)Intermodal equipment including tank containers
(c)Highway transport vehicles, including cargo tanks

OPS-2.2.2
NFPA 3-2.1.2.2
OSHA OPS-A

Given examples of facility containers, identify the markings indicating container size, product contained, and/or site identification numbers.

OPS-2.3
NFPA 3-2.1.3
OSHA OPS-A
OSHA AWARE-E

Given examples of facility and transportation situations involving hazardous materials, identify the name(s) of the hazardous material(s) in each situation.

OPS-2.3.1
NFPA 3-2.1.3.1
OSHA OPS-A
OSHA AWARE-E

Identify the following information on a pipeline marker:
(a)Product
(b)Owner
(c)Emergency telephone number

OPS-2.3.2
NFPA 3-2.1.3.2
OSHA OPS-A
OSHA AWARE-E

Given a pesticide label, identify each of the following pieces of information; then match the piece of information to its significance in surveying the hazardous materials incident:
(a)Name of pesticide
(b)Signal word
(c)Pest control product (PCP) number (in Canada)
(d)Precautionary statement
(e)Hazard statement
(f)Active ingredient

OPS-2.4
NFPA 3-2.1.4
OSHA OPS-A

Identify and list the surrounding conditions that should be noted by the first responders when surveying hazardous materials incidents.

OPS-2.5
NFPA 3-2.1.5
OSHA OPS-A

Give examples of ways to verify information obtained from the survey of a hazardous materials incident.

OPS-2.6
NFPA 3-2.1.6
(See Special Topics: Terrorism)

Identify at least three additional hazards that could be associated with an incident involving criminal or terrorist activity.
The following are some examples of hazards:
(a)Secondary events intended to incapacitate emergency responders
(b)Armed resistance
(c)Use of weapons
(d)Booby traps
(e)Secondary contamination from handling patients
(f)Hostage barricade situations

Analyzing the Incident

Collecting Hazard and Response Information

OPS-3
NFPA 3-2.2
OSHA OPS-A

Given known hazardous materials, collect hazard and response information using material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and contacts with the shipper/manufacturer.

OPS-3.1
NFPA 3-2.2.1
OSHA OPS-A
OSHA AWARE-E

Match the definitions associated with the DOT hazard classes and divisions of hazardous materials, including refrigerated liquefied gases and cryogenic liquids, with the class or division.

OPS-3.2
NFPA 3-2.2.2
OSHA OPS-A

Identify two ways to obtain a material safety data sheet (MSDS) in an emergency.

OPS-3.3
NFPA 3-2.2.3
OSHA OPS-A,B,C,D,F
OSHA AWARE-A
OSHA I.C.-C.4

Using a material safety data sheet (MSDS) for a specified material, identify the following hazard and response information:

(a)Physical and chemical characteristics
(b)Physical hazards of the material
(c)Health hazards of the material
(d)Signs and symptoms of exposure
(e)Routes of entry
(f)Permissible exposure limits
(g)Responsible party contact
(h)Precautions for safe handling (including hygiene practices, protective measures, procedures for cleanup of spills or leaks)
(i)Applicable control measures including personal protective equipment
(j)Emergency and first aid procedures

OPS-3.4
NFPA 3-2.2.4
OSHA OPS-A
OSHA AWARE-E

Identify the following:

(a)Type of assistance provided by CHEMTREC/CANUTEC/SETIQ
(b)Procedure for contacting CHEMTREC/CANUTEC/SETIQ
(c)Information to be furnished to CHEMTREC/CANUTEC/SETIQ

OPS-3.5
NFPA 3-2.2.5
OSHA OPS-A
OSHA AWARE-E

Identify two methods of contacting the manufacturer or shipper to obtain hazard and response information.

OPS-3.6
NFPA 3-2.2.6
(See Special Topics: Terrorism)

Identify the type of assistance provided by the federal defense authorities, such as the Defense Logistics agency and the U.S. Army Operations Center, with respect to criminal or terrorist activities involving hazardous materials.

OPS-3.6.1
NFPA 3-2.2.6.1
(See Special Topics: Terrorism)

Identify the procedure for contacting federal defense authorities as specified in the local emergency response plan (ERP) or the organization's standard operating procedure (SOP).

Analyzing the Incident

Predicting the Behavior of a Material and its Container

OPS-4
NFPA 3-2.3
OSHA OPS-A

Given an incident involving a single hazardous material, predict the likely behavior of the material and its container.

OPS-4.1
NFPA 3-2.3.1
OSHA OPS-C
OSHA AWARE-E

Given two examples of scenarios involving known hazardous materials, interpret the hazard and response information obtained from the current edition of the *North American Emergency Response Guidebook*, material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and shipper/manufacturer contacts.

OPS-4.1.1
NFPA 3-2.3.1.1
OSHA OPS-C
OSHA AWARE-E

Match the following chemical and physical properties with their significance and impact on the behavior of the container and/or its contents:
(a)Boiling point
(b)Chemical reactivity
(c)Corrosivity (pH)
(d)Flammable (explosive) range (LEL & UEL)
(e)Flash point
(f)Ignition (autoignition) temperature
(g)Physical state (solid, liquid, gas)
(h)Specific gravity
(i)Toxic products of combustion
(j)Vapor density
(k)Vapor pressure
(l)Water solubility

OPS-4.1.2
NFPA 3-2.3.1.2
OSHA OPS-C

Identify the differences among the following terms:
(a)Exposure and hazard
(b)Exposure and contamination
(c)Contamination and secondary contamination

OPS-4.2
NFPA 3-2.3.2
OSHA OPS-A

Identify three types of stress that could cause a container system to release its contents.

OPS-4.3
NFPA 3-2.3.3
OSHA OPS-A

Identify five ways in which containers can breach.

OPS-4.4
NFPA 3-2.3.4
OSHA OPS-A

Identify four ways in which containers can release their contents.

OPS-4.5
Rad. 1st Resp.
(See Special Topics)

Identify the general testing requirements for “Type A,” ”Type B,” and “Special Form” packaging used for radioactive material transportation.

OPS-4.6
Rad. 1st Resp.
(See Special Topics)

Identify common “industrial radiography” sources and any specialized large-quantity radioactive materials packages commonly transported through the local jurisdiction by their shapes and characteristics.

OPS-4.7
NFPA 3-2.3.5
OSHA OPS-A

Identify at least four dispersion patterns that can be created upon release of a hazardous material.

OPS-4.8
NFPA 3-2.3.6
OSHA OPS-A

Identify the three general time frames for predicting the length of time that exposures can be in contact with hazardous materials in an endangered area.

OPS-4.9
NFPA 3-2.3.7
OSHA OPS-A

Identify the health and physical hazards that could cause harm.

OPS-4.10
NFPA 3-2.3.8
OSHA OPS-A,C

Identify the health hazards associated with the following terms:
(a)Asphyxiant
(b)Chronic health hazard
(c)Convulsant
(d)Irritant/corrosive
(e)Sensitizer/allergen

OPS-4.11
NFPA 3-2.3.9
(See Special Topics: Terrorism)

Given the following types of warfare agents, identify the corresponding DOT hazard class and division:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Blood agents
(d)Choking agents
(e)Irritants (riot control agents)
(f)Biological agents and toxins

See Special Topics: Terrorism for NFPA detailed examples.

Analyzing the Incident
Estimating the Potential Harm

OPS-5
NFPA 3-2.4
OSHA OPS-A

Given simulated incidents involving hazardous materials, estimate the potential harm within the endangered area.

OPS-5.1
NFPA 3-2.4.1
OSHA OPS-A

Identify a resource for determining the size of an endangered area of a hazardous materials incident.

OPS-5.2
NFPA 3-2.4.2
OSHA OPS-A

Given the dimensions of the endangered area and the surrounding conditions at a hazardous materials incident, estimate the number and type of exposures within that endangered area.

OPS-5.3
NFPA 3-2.4.3
OSHA OPS-A

Identify resources available for determining the concentrations of a released hazardous material within an endangered area.

OPS-5.4
NFPA 3-2.4.4
OSHA OPS-A

Given the concentrations of the released material, identify the factors for determining the extent of physical, health, and safety hazards within the endangered area of a hazardous materials incident.

Planning the Response
Describing Response Objectives for Hazardous Materials Incidents

OPS-6
NFPA 3-3.1
OSHA OPS-B,D

Given at least two scenarios involving hazardous materials incidents (one facility and one transportation), describe the first responder's response objectives for each problem.

OPS-6.1
NFPA 3-3.1.1
OSHA OPS-B,D

Identify the steps for determining the number of exposures that could be saved by the first responder with the resources provided by the authority having jurisdiction and operating in a defensive fashion, given an analysis of a hazardous materials problem and the exposures already lost.

OPS-6.2
NFPA 3-3.1.2
OSHA OPS-B,D

Describe the steps for determining defensive response objectives, given an analysis of a hazardous materials incident.

Planning the Response
Identifying Defensive Options

OPS-7
NFPA 3-3.2
OSHA OPS-D

Given simulated facility and transportation hazardous materials problems, identify the defensive options for each response objective.

OPS-7.1
NFPA 3-3.2.1
OSHA OPS-D,F

Identify the defensive options to accomplish a given response objective.

OPS-7.2
NFPA 3-3.2.2
OSHA OPS-F

Identify the purpose for, and the procedures, equipment, and safety precautions used with, each of the following control techniques:

(a)Absorption
(b)Dike, dam, diversion, retention
(c)Dilution
(d)Remote valve shutoff
(e)Vapor dispersion
(f)Vapor suppression

Planning the Response
Determining Appropriateness of Personal Protective Equipment

OPS-8
NFPA 3-3.3
OSHA OPS-B

Given the name of the hazardous material involved and the anticipated type of exposure, determine whether available personal protective equipment is appropriate for implementing a defensive option.

OPS-8.1
NFPA 3-3.3.1
OSHA I.C.-B.1,C.2

Identify the appropriate respiratory protection required for a given defensive option.

OPS-8.1.1
NFPA 3-3.3.1.1
OSHA I.C.-B.1,C.2

Identify the three types of respiratory protection and the advantages and limitations presented by the use of each at hazardous materials incidents.

OPS-8.1.2
NFPA 3-3.3.1.2
OSHA I.C.-B.1,C.2

Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.

OPS-8.2
NFPA 3-3.3.2
OSHA I.C.-B.1,C.2

Identify the appropriate personal protective clothing required for a given defensive option.

OPS-8.2.1
NFPA 3-3.3.2.1
OSHA AWARE-A

Identify skin contact hazards encountered at hazardous materials incidents.

OPS-8.2.2
NFPA 3-3.3.2.2
OSHA OPS-B

Identify the purpose, advantages, and limitations of the following levels of protective clothing at hazardous materials incidents:

(a)Structural fire-fighting protective clothing
(b)High temperature-protective clothing
(c)Chemical-protective clothing
1.Liquid splash-protective clothing
2.Vapor-protective clothing

Planning the Response
Identifying Emergency Decontamination Procedures

OPS-9
NFPA 3-3.4
OSHA OPS-E,F

Given a plan of action for a hazardous materials incident, identify emergency decontamination procedures.

OPS-9.1
NFPA 3-3.4.1
OSHA OPS-A
OSHA AWARE-A,B

Identify ways that personnel, personal protective equipment, apparatus, and tools and equipment become contaminated.

OPS-9.2
NFPA 3-3.4.2
OSHA OPS-A
OSHA AWARE-A,B

Describe how the potential for secondary contamination determines the need for emergency decontamination procedures.

OPS-9.3
NFPA 3-3.4.3
OSHA OPS-E,F

Identify the purpose of emergency decontamination procedures at hazardous materials incidents.

OPS-9.4
NFPA 3-3.4.4
OSHA OPS-A,E,F

Identify the advantages and limitations of emergency decontamination procedures.

OPS-9.5
Rad. 1st Resp.
(See Special Topics)

Identify appropriate, simple procedures for dealing with accident victims with life-threatening injuries who are known or suspected to be contaminated with radioactive material.

OPS-9.6
NFPA 3-3.4.5
(See Special Topics: Terrorism)

Describe the procedure listed in the local Emergency Response Plan or the organization's Standard Operating Procedures for decontamination of a large number of people exposed to hazardous materials.

Implementing the Planned Response
Establishing and Enforcing Scene Control Procedures

OPS-10
NFPA 3-4.1
OSHA OPS-A
OSHA I.C.-B

Given scenarios for facility and/or transportation hazardous materials incidents, identify how to establish and enforce scene control including control zones, emergency decontamination, and communications.

OPS-10.1
NFPA 3-4.1.1
OSHA OPS-F
OSHA I.C.-B,D

Identify the procedures for establishing scene control through control zones.

OPS-10.2
NFPA 3-4.1.2
OSHA I.C.-B,D

Identify the criteria for determining the locations of the control zones at hazardous materials incidents.

OPS-10.3
NFPA 3-4.1.3
OSHA I.C.-B,D

Identify the basic techniques for the following protective actions at hazardous materials incidents:

(a)Evacuation
(b)Sheltering in-place protection

OPS-10.4
NFPA 3-4.1.4
OSHA OPS-E,F

Identify the considerations associated with locating emergency decontamination areas.

OPS-10.5
NFPA 3-4.1.5
OSHA OPS-E

Demonstrate the ability to perform emergency decontamination.

OPS-10.6
NFPA 3-4.1.6
OSHA OPS-F
OSHA I.C.-B.1
(See Special Topics: Terrorism)

Identify the items to be considered in a safety briefing prior to allowing personnel to work at the following:

(a)Hazardous materials incident
(b)Hazardous materials incident with criminal or terrorist activities

Implementing the Planned Response
Initiating the Incident Management System (IMS)

OPS-11
NFPA 3-4.2
OSHA I.C.-A,A.2

Given simulated facility and/or transportation hazardous materials incidents, initiate the incident management system (IMS) specified in the local emergency response plan and the organization's standard operating procedures.

OPS-11.1
NFPA 3-4.2.1
OSHA OPS-F
OSHA I.C.-D

Identify the role of the first responder at the operational level during hazardous materials incidents as specified in the local emergency response plan and the organization's standard operating procedures.

OPS-11.2
NFPA 3-4.2.2
OSHA I.C.-D

Identify the levels of hazardous materials incidents as defined in the local emergency response plan.

OPS-11.3	NFPA 3-4.2.3 *OSHA I.C.-A,A.1,A.2,B,D*	Identify the purpose, need, benefits, and elements of an incident management system (IMS) at hazardous materials incidents.
OPS-11.4	NFPA 3-4.2.4 *OSHA I.C.-A,B,D*	Identify the considerations for determining the location of the command post for a hazardous materials incident.
OPS-11.5	NFPA 3-4.2.5 *OSHA I.C.-A,B,D*	Identify the procedures for requesting additional resources at a hazardous materials incident.
OPS-11.6	NFPA 3-4.2.6 *OSHA I.C.-A.3,C.1*	Identify the authority and responsibilities of the safety officer.

Implementing the Planned Response
Using Personal Protective Equipment

OPS-12	NFPA 3-4.3 *OSHA OPS-B*	Demonstrate the ability to don, work in, and doff the personal protective equipment provided by the authority having jurisdiction.
OPS-12.1	NFPA 3-4.3.1 *OSHA I.C.-C.5*	Identify the importance of the buddy system in implementing the planned defensive options.
OPS-12.2	NFPA 3-4.3.2 *OSHA I.C.-C.2*	Identify the importance of the backup personnel in implementing the planned defensive options.
OPS-12.3	NFPA 3-4.3.3 *OSHA OPS-F*	Identify the safety precautions to be observed when approaching and working at hazardous materials incidents.
OPS-12.4	NFPA 3-4.3.4 *OSHA OPS-F*	Identify the symptoms of heat and cold stress.
OPS-12.5	NFPA 3-4.3.5 *OSHA I.C.-C*	Identify the physical capabilities required for, and the limitations of, personnel working in the personal protective equipment as provided by the authority having jurisdiction.
OPS-12.6	NFPA 3-4.3.6 *OSHA OPS-C*	Match the function of the operational components of the positive pressure self-contained breathing apparatus provided to the hazardous materials responder with the name of the component.
OPS-12.7	NFPA 3-4.3.7 *OSHA 29 CFR 1910.134*	Identify the procedures for cleaning, disinfecting, and inspecting respiratory protective equipment.

OPS-12.8
NFPA 3-4.3.8
OSHA 29 CFR 1910.134

Identify the procedures for donning, working in, and doffing positive pressure self-contained breathing apparatus.

OPS-12.9
NFPA 3-4.3.9
OSHA 29 CFR 1910.134

Demonstrate donning, working in, and doffing positive pressure self-contained breathing apparatus.

Implementing the Planned Response
Performing Defensive Control Actions

OPS-13
NFPA 3-4.4
OSHA OPS-D

Given a plan of action for a hazardous materials incident within their capabilities, demonstrate defensive control actions set out in the plan.

OPS-13.1
NFPA 3-4.4.1
OSHA OPS-D

Using the type of fire-fighting foam or vapor suppressing agent and foam equipment furnished by the authority having jurisdiction, demonstrate the proper application of the fire-fighting foam(s) or vapor suppressing agent(s) on a spill or fire involving hazardous materials.

OPS-13.2
NFPA 3-4.4.2
OSHA OPS-D

Identify the characteristics and applicability of the following foams:

(a)Protein
(b)Fluoroprotein
(c)Special purpose
    1.Polar solvent alcohol-resistant concentrates
    2.Hazardous materials concentrates
(d)Aqueous film-forming foam (AFFF)
(e)High expansion

OPS-13.3
NFPA 3-4.4.3
OSHA OPS-D,F

Given the appropriate tools and equipment, demonstrate how to perform the following defensive control activities:

(a)Absorption
(b)Damming
(c)Diking
(d)Dilution
(e)Diversion
(f)Retention
(g)Vapor dispersion
(h)Vapor suppression

OPS-13.4
NFPA 3-4.4.4
OSHA OPS-D,F

Identify the location and describe the use of the mechanical, hydraulic, and air emergency remote shutoff devices as found on cargo tanks.

OPS-13.5
NFPA 3-4.4.5
OSHA OPS-D,F

Describe the objectives and dangers of search and rescue missions at hazardous materials incidents.

OPS-13.6
NFPA 3-4.4.6
OSHA OPS-D,F
(See Special Topics: Terrorism)

Describe procedures, such as those listed in the local Emergency Response Plan or the organization's Standard Operating Procedures, to preserve evidence at hazardous materials incidents involving suspected criminal or terrorist acts.

Evaluating Progress

Evaluating the Status of Defensive Actions

OPS-14
NFPA 3-5.1
OSHA OPS-D

Given simulated facility and/or transportation hazardous materials incidents, evaluate the status of the defensive actions taken in accomplishing the response objectives.

OPS-14.1
NFPA 3-5.1.1
OSHA OPS-D
OSHA I.C.-A,D

Identify the considerations for evaluating whether defensive options are effective in accomplishing the objectives.

OPS-14.2
NFPA 3-5.1.2
OSHA OPS-D,F
OSHA I.C.-A,D
(See Special Topics: Terrorism)

Describe the circumstances under which it would be prudent to withdraw from a hazardous materials incident.

Evaluating Progress

Communicating the Status of the Planned Response

OPS-15
NFPA 3-5.2
OSHA OPS-D

Given simulated facility and/or transportation hazardous materials incidents, communicate the status of the planned response to the incident commander and other response personnel.

OPS-15.1
NFPA 3-5.2.1
OSHA OPS-D

Identify the methods for communicating the status of the planned response to the incident commander through the normal chain of command.

OPS-15.2
NFPA 3-5.2.2
OSHA OPS-A,D

Identify the methods for immediate notification of the incident commander and other response personnel about critical emergency conditions at the incident.

Hazardous Materials

Incident Response Training Guidelines

Hazardous Materials Technician

General Training Considerations

Introduction

Hazardous materials technicians shall be trained to meet all requirements of the first responder at the awareness and operations level and the technician level of emergency hazardous materials response. In addition, technicians shall meet the training requirements and be provided medical surveillance in accordance with requirements of OSHA, local occupational health and safety regulatory agencies, or EPA, as appropriate for their jurisdiction.

Definition

Technicians are those persons who respond to releases or potential releases of hazardous materials for the purpose of controlling the release. They are more aggressive than first responders at the operations level in that they will approach the point of release to plug, patch, or otherwise stop the release of a hazardous materials substance. They are expected to use specialized chemical protective clothing and specialized control equipment.

Audience

Technicians typically are members of hazardous materials response teams, which consist of specifically trained personnel who respond to hazardous materials incidents. The teams perform various response actions including assessment, firefighting, rescue, and containment; they are *not* responsible for cleanup operations following the incidents. Technicians are employed by various public and private organizations including fire or emergency medical services, law enforcement, public health, utilities, manufacturers, and contractors. By definition, technicians must be well versed in a wide variety of topics. They are expected to respond to most kinds of hazardous materials incidents that would occur in their jurisdictions. Therefore, training managers should be careful not to make this broad-based training too specialized. A community's analysis may suggest modifications. Emphasis should be placed on the most prevalent types of chemicals and incidents.

Equipment, Facilities, and Resources

Hazardous materials technician training requires both classroom and hands-on workspace as well as reference materials, equipment, and props. Consideration must be given to class size, weather conditions, number of instructors or evaluators, and available equipment and props. Because of the time involved in demonstration and performance activities, class size must be limited. A reasonable student-to-teacher ratio is 30:1 for lecture and 10:1 for hands-on activities, although some blocks of instruction (such as work with live chemicals) may require a 5:1 ratio. Extreme cold or heat will affect outdoor activities involving protective clothing, chemicals, and props. If outdoor exercises involving chemical protective clothing or actual chemicals are to be conducted, neighboring residences and facilities must be considered and notified. Arrangements for secured storage must be made to handle the expensive equipment that will have to be located near the classroom and work area.

Methodology Recommendation

Hazardous materials technician training is best conducted with a combination of classroom instruction using traditional lecture and small-group activities, field exercises involving group practice in simulated emergencies, and hands-on skill training in doing actual control, confinement, and containment exercises. Typically, training ranges from 40 to 240 hours, and longer courses often include awareness and operations training. There should be a strong emphasis on hands-on practice and incident decision-making. Content instruction should be synthesized in student activities requiring analysis of incident information to determine plans of action. Skill training should be performed on actual containers with simulated releases, using full protective equipment and proper response tools. Skill training should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential. Refresher training should include (1) competency retesting of all response skills, (2) technical information updates, and (3) critique of incident scene decision-making using simulated emergencies

Federal Requirements

For Hazardous Materials Technician Training

OSHA establishes the following training requirements for hazardous materials technicians. Methods of testing are not specified. Technicians shall have awareness training and operations training (for a minimum of 24 hours) and training at the technician level. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA CFR 1910.120 (q)(6)(iii)
HAZARDOUS MATERIALS TECHNICIAN

Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following area and the employer shall so certify:

- *(A) Know how to implement the employer's emergency response plan*
- *(B) Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment*
- *(C) Be able to function within an assigned role in the Incident Command System*
- *(D) Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician*
- *(E) Understand hazard and risk assessment techniques*
- *(F) Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit*
- *(G) Understand and implement decontamination procedures*
- *(H) Understand termination procedures*
- *(I) Understand basic chemical and toxicological terminology and behavior*

OSHA 29 CFR 1910.120(q)(10)

(10) Chemical protective clothing. Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists, shall meet the requirements of paragraphs (g)(3) through (5) of this section.

Required Training is specified in the OSHA regulations listed above. For the convenience of course assessment, the requirements are translated directly into the following nine sample principal objectives.

Identification	*Sample **Required** Training Objectives*
OSHA TECH-A	Given a simulated incident involving hazardous materials, demonstrate implementation of the employer's emergency response plan.
OSHA TECH-B	Using field survey instruments and equipment, classify, identify, and verify known and unknown hazardous materials.
OSHA TECH-C	Given a simulated incident involving hazardous materials, demonstrate functioning within an assigned role in the incident command system.

Required Training

OSHA TECH-D	Given a simulated incident involving hazardous materials, select and demonstrate use of proper specialized chemical personal protective equipment provided to the hazardous materials technician.
OSHA TECH-E	Identify hazard and risk assessment techniques.
OSHA TECH-F	Given simulated incidents involving different hazardous materials containers and releases, demonstrate advanced control, containment, and/or confinement operations.
OSHA TECH-G	Given a simulated incident involving hazardous materials, identify and demonstrate decontamination procedures.
OSHA TECH-H	List and describe hazardous materials incident termination procedures.
OSHA TECH-I	Define basic chemical and toxicological terms and describe basic chemical and toxicological behavior.

SUMMARY: Hazardous Materials Technician

OSHA minimum requirement=24 hours Operations training + Technician training

Audience	Prerequisites	Training	Refresher
Narrow. Prospective hazardous materials team members and others who are designated in response plans as a general resource to perform advanced defensive/ offensive operations at all anticipated hazardous materials emergencies.	1. First Responder Awareness training. 2. First Responder Operations training (min. 24 hours required).	- 40-240 hours. - Classroom and simulator/field instruction, with emphasis on hands-on training. - Competencies: - Knowledge of role of technician within incident command system and responsibilities within employer's emergency response plan. - Knowledge of hazardous materials terminology, behavior, and ability to perform advanced hazard and risk assessment using field survey instruments and equipment. - Ability to perform advanced control, containment and/or confinement techniques. - Ability to select and use specialized personal protective equipment. - Ability to implement decontamination procedures. - Knowledge of termination procedures.	1. Competency retesting of all response skills. 2. Technical information updates. 3. Incident scene decision-making using simulated emergencies.

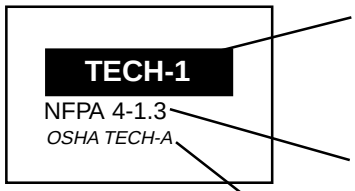
Recommended Training

For Hazardous Materials Technician Training

The following training objectives are recommended for hazardous materials technician training. The primary source for this material is NFPA 472, Chapter 4: Hazardous Materials Technician. Training objectives from other sources are noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

In general, these objectives compare in scope to those minimally required by OSHA. They do not constitute an increased level of training, but rather provide greater depth of definition of student objectives. To assist in assessing course compliance with OSHA 1910.120(q), the relationships between these objectives and the OSHA requirements are noted. References to OSHA 29 CFR 1910.120(q)(6)(iii)(A to I) are abbreviated as OSHA TECH-A to I.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as TECH-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective, Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 29 CFR 1910.120(q)(6)(iii)(A to I) = OSHA TECH-A to I

OSHA 29 CFR 1910.120(q)(6)(iv)(A to I) = OSHA HMSPEC-A to I

OSHA 29 CFR 1910.120(q)(6)(v)(A to F) = OSHA I.C.-A to F

OSHA 29 CFR 1910.120(q)(3)(i-ix) are subsumed under OSHA I.C.-A to F

Identification	***Recommended** Training Objectives*
TECH-1 NFPA 4-1.3 *OSHA TECH-A,B,E*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the hazardous materials technician.
TECH-1.1 NFPA 4-1.3(a) *OSHA TECH-B,E,I*	Describe the responsibility to analyze the hazardous materials incident and determine the magnitude of the problem in terms of outcomes.
TECH-1.1.1 NFPA 4-1.3(a)1 *OSHA TECH-B,E,I*	Identify the responsibility to survey the hazardous materials incident to identify special containers involved, to identify or classify unknown materials, and to verify the presence and concentrations of hazardous materials through the use of monitoring equipment.
TECH-1.1.2 NFPA 4-1.3(a)2 *OSHA TECH-B,E,I*	Identify the responsibility to collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment.

TECH-1.1.3 Identify the responsibility to determine the extent of damage to containers.
NFPA 4-1.3(a)3
OSHA TECH-B,E,I

TECH-1.1.4 Identify the responsibility to predict the likely behavior of released materials and their containers when multiple materials are involved.
NFPA 4-1.3(a)4
OSHA TECH-B,E,I

TECH-1.1.5 Identify the responsibility to estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this field.
NFPA 4-1.3(a)5
OSHA TECH-B,E,I

TECH-1.2 Describe the responsibility to plan a response within the capabilities of available personnel, personal protective equipment, and control equipment.
NFPA 4-1.3(b)
OSHA TECH-A,B,C,D,E

TECH-1.2.1 Identify the response objectives for hazardous materials incidents.
NFPA 4-1.3(b)1
OSHA TECH-A,B,C,D,E

TECH-1.2.2 Identify the potential action options available by response objective.
NFPA 4-1.3(b)2
OSHA TECH-A,B,C,D,E

TECH-1.2.3 Identify the responsibility to select the personal protective equipment required for a given action option.
NFPA 4-1.3(b)3
OSHA TECH-A,B,C,D,E

TECH-1.2.4 Identify the responsibility to select the appropriate decontamination procedures.
NFPA 4-1.3(b)4
OSHA TECH-A,B,C,D,E

TECH-1.2.5 Identify the responsibility to develop a plan of action, including safety considerations, consistent with the local emergency response plan and the organization's standard operating procedures, and within the capability of the available personnel, personal protective equipment, and control equipment.
NFPA 4-1.3(b)5
OSHA TECH-A,B,C,D,E

TECH-1.3 Describe the responsibility to implement the planned response to favorably change the outcomes consistent with the organization's standard operating procedures and safety considerations.
NFPA 4-1.3(c)
OSHA TECH-D,F,G,H

TECH-1.3.1 Identify the responsibility to perform the duties of an assigned hazardous materials branch position within the local incident management system (IMS).
NFPA 4-1.3(c)1
OSHA TECH-D,F,G,H

TECH-1.3.2 Identify the responsibility to don, work in, and doff appropriate personal protective clothing, including, but not limited to, both liquid splash- and vapor-protective clothing with appropriate respiratory protection.
NFPA 4-1.3(c)2
OSHA TECH-D,F,G,H

TECH-1.3.3 Identify the responsibility to perform the control functions identified in the plan of action.
NFPA 4-1.3(c)3
OSHA TECH-D,F,G,H

TECH-1.4
NFPA 4-1.3(d)
OSHA TECH-C,F

Describe the responsibility to evaluate the progress of the planned response by evaluating the effectiveness of the control functions.

TECH-1.5
NFPA 4-1.3(e)
OSHA TECH-H

Describe the responsibility to terminate the incident.

TECH-1.5.1
NFPA 4-1.3(e)1
OSHA TECH-C,H

Identify the responsibility to assist in the incident debriefing.

TECH-1.5.2
NFPA 4-1.3(e)2
OSHA TECH-C,H

Identify the responsibility to assist in the incident critique.

TECH-1.5.3
NFPA 4-1.3(e)3
OSHA TECH-A,H

Identify the responsibility to provide reports and documentation of the incident.

Analyzing the Incident
Surveying the Hazardous Materials Incident

TECH-2
NFPA 4-2.1
OSHA TECH-B,E

Identify special containers involved and, given the appropriate equipment, identify or classify unknown materials, verify the identity of the hazardous materials, and determine the concentration of hazardous materials.

TECH-2.1
NFPA 4-2.1.1
OSHA TECH-E

Given examples of various specialized containers, identify each container by name and identify the material, and its hazard class, that is typically found in the container.

TECH-2.1.1
NFPA 4-2.1.1.1
OSHA TECH-E

Given examples of the following railroad cars, identify each car by type and identify at least one material, and its hazard class, that is typically found in each car:
(a)Cryogenic liquid tank cars
(b)High-pressure tube cars
(c)Nonpressure tank cars
(d)Pneumatically unloaded hopper cars
(e)Pressure tank cars

TECH-2.1.2
NFPA 4-2.1.1.2
OSHA TECH-E

Given examples of the following intermodal tanks, identify each intermodal tank by type and identify at least one material, and its hazard class, that is typically found in each tank:
(a)Nonpressure intermodal tanks:
1.IM-101 (IMO Type 1 internationally) portable tank
2.IM-102 (IMO Type 2 internationally) portable tank
(b)Pressure intermodal tanks (DOT 51) (IMO Type 5 internationally)
(c)Specialized intermodal tanks:
1.Cryogenic intermodal tanks (IMO Type 7 internationally)
2.Tube modules

TECH-2.1.3
NFPA 4-2.1.1.3
OSHA TECH-E

Given examples of the following cargo tanks, identify at least one material, and its hazard class, that is typically found in each tank:
(a)Dry bulk cargo tanks
(b)MC306/DOT-406 cargo tanks
(c)MC307/DOT-407 cargo tanks
(d)MC312/DOT-412 cargo tanks
(e)MC331 cargo tanks
(f)MC-338 cargo tanks

TECH-2.1.4
NFPA 4-2.1.1.4
OSHA TECH-E

Given examples of the following facility tanks, identify at least one material, and its hazard class, that is typically found in each tank:
(a)Nonpressure tank
(b)Pressure tank

TECH-2.1.5
NFPA 4-2.1.1.5
OSHA TECH-E

Given examples of the following nonbulk containers, identify at least one material, and its hazard class, that is typically found in each container:
(a)Bags
(b)Carboys
(c)Cylinders
(d)Drums

TECH-2.1.6
NFPA 4-2.1.1.6
(See Special Topics: Terrorism)

For each of the following, describe a method that can be used to detect them:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Biological agents and toxin
(d)Irritants (riot control agents)

TECH-2.1.7
NFPA 4-2.1.1.7
OSHA TECH-E

Given examples of the following radioactive materials packages, identify each package by type and identify at least one typical material found in each package:
(a)Type A
(b)Type B

TECH-2.2
NFPA 4-2.1.2
OSHA TECH-E

Given three examples of facility and transportation containers, identify the approximate capacity of each container.

TECH-2.2.1
NFPA 4-2.1.2.1
OSHA TECH-E

Using the markings on the container, identify the capacity (by weight and/or volume) of the following examples of transportation vehicles:
(a)Cargo tanks
(b)Tank cars
(c)Tank containers

TECH-2.2.2
NFPA 4-2.1.2.2
OSHA TECH-E

Using the markings on the container and other available resources, identify the capacity (by weight and/or volume) of each of the following facility containers:
(a)Nonpressure tank
(b)Pressure tank
(c)Cryogenic liquid tank

TECH-2.3
NFPA 4-2.1.3
OSHA TECH-B

Given at least three unknown materials, one of which is a solid, one a liquid, and one a gas, identify or classify by hazard each unknown material.

TECH-2.3.1
NFPA 4-2.1.3.1
OSHA TECH-B

Identify the steps in an analysis process for identifying unknown solid and liquid materials.

TECH-2.3.2
NFPA 4-2.1.3.2
OSHA TECH-B

Identify the steps in an analysis process for identifying an unknown atmosphere.

TECH-2.3.3
NFPA 4-2.1.3.3
OSHA TECH-B

Identify the type(s) of monitoring equipment, test strips, and reagents used to determine the following hazards:
(a)Corrosivity (pH)
(b)Flammability
(c)Oxidation potential
(d)Oxygen deficiency
(e)Radioactivity
(f)Toxic levels

TECH-2.3.4
NFPA 4-2.1.3.4
OSHA TECH-B

Identify the capabilities and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)Passive dosimeter
(f)Photoionization detectors
(g)pH indicators and/or pH meters
(h)Radiation detection instruments
(i)Reagents
(j)Test strips

TECH-2.3.5
Rad. 1st Resp.
(See Special Topics)
OSHA TECH-B

Demonstrate how radiation detection instruments may be used defensively.

TECH-2.3.6
NFPA 4-2.1.3.5
OSHA TECH-B

Given three hazardous materials, one of which is a solid, one a liquid, and one a gas, and the following monitoring equipment, test strips, and reagents, select the appropriate equipment and demonstrate the proper techniques to identify and quantify the materials:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)pH indicators and/or pH meters
(f)Radiation detection instruments
(g)Reagents
(h)Test strips

TECH-2.3.7
NFPA 4-2.1.3.6
OSHA TECH-B

Demonstrate the field maintenance and testing procedures for the monitoring equipment, test strips, and reagents provided by the authority having jurisdiction.

TECH-2.4
NFPA 4-2.1.4
OSHA TECH-B

Given a label for a radioactive material, identify vertical bars, contents, activity, and transport index, then describe the labeled item and its significance in surveying a radioactive materials incident.

Analyzing the Incident
Collecting and Interpreting Hazard and Response Information

TECH-3
NFPA 4-2.2
OSHA TECH-B,E

Given access to printed resources, technical resources, computer data bases, and monitoring equipment, collect and interpret hazard and response information not available from the current edition of the *North American Emergency Response Guidebook* or a material safety data sheet (MSDS).

TECH-3.1
NFPA 4-2.2.1
OSHA TECH-B,E

Identify and interpret the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

(a)Hazardous materials data bases
(b)Maps and diagrams
(c)Monitoring equipment
(d)Reference manuals
(e)Technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ)
(f)Technical information specialists

TECH-3.2
NFPA 4-2.2.2
OSHA TECH-E
(See Special Topics: Terrorism)

Describe the following terms and explain their significance in the risk assessment process: (a)Acid, caustic; (b) Air reactivity; (c) Boiling point; (d) Catalyst; (e) Chemical interactions; (f) Chemical reactivity; (g) Compound, mixture; (h) Concentration; (i) Corrosivity (pH); (j) Critical temperatures and pressure; (k) Expansion ratio; (l) Flammable (explosive) range (LEL & UEL); (m) Fire point; (n) Flash point; (o) Halogenated hydrocarbon; (p) Ignition (autoignition) temperature; (q) Inhibitor; (r) Instability; (s) Ionic & covalent compounds; (t) Maximum safe storage temperature (MSST); (u) Melting point/freezing point; (v) Miscibility; (w) Organic and inorganic; (x) Oxidation potential; (y) pH; (z) Physical state (solid, liquid, gas); (aa) Polymerization; (bb) Radioactivity; (cc) Saturated, unsaturated, and aromatic hydrocarbons; (dd) Self-accelerating decomposition temperature (SADT); (ee) Solution, slurry; (ff) Specific gravity; (gg) Strength; (hh) Sublimation; (ii) Temperature of product; (jj) Toxic products of combustion; (kk) Vapor density; (ll) Vapor pressure; (mm) Viscosity; (nn) Volatility; (oo) Water reactivity; (pp) Water solubility; (qq) Nerve agents; (rr) Vesticants (blister agents); (ss) Biological agents and toxins; and (tt) Irritants (riot control agents).

TECH-3.3
NFPA 4-2.2.3
OSHA TECH-E

Describe the heat transfer processes that occur as a result of a cryogenic liquid spill.

TECH-3.4
NFPA 4-2.2.4
OSHA TECH-E

Given five hazardous material scenarios and the appropriate reference materials, identify the signs and symptoms of exposure to each material and the target organ effects of exposure to that material.

TECH-3.5
NFPA 4-2.2.5
OSHA TECH-B,E

Given the scenario of a domestic gas line break and the readings from a combustible gas indicator, determine the area of evacuation.

TECH-3.6
NFPA 4-2.2.6
OSHA TECH-B,E

Identify two methods for determining the pressure in bulk packaging or facility containers.

TECH-3.7
NFPA 4-2.2.7
OSHA TECH-B,E

Identify one method for determining the amount of lading remaining in damaged bulk packaging or facility containers.

Analyzing the Incident
Describing the Condition of the Container Involved in the Incident

TECH-4
NFPA 4-2.3
OSHA TECH-E

Given simulated facility and transportation container damage, describe the damage.

TECH-4.1
NFPA 4-2.3.1
OSHA TECH-E

Given three examples of containers, DOT specification markings for nonbulk and bulk packaging, and the appropriate reference guide, identify the basic design and construction features of each container.

TECH-4.1.1
NFPA 4-2.3.1.1
OSHA TECH-E

Identify the basic design and construction features, including closures, of the following bulk containers:

(a)Cargo tanks:
1.Dry bulk cargo tanks
2.MC-306/DOT-406 cargo tanks
3.MC-307/ DOT-407 cargo tanks
4.MC-312/DOT-412 cargo tanks
5.MC-331 cargo tanks
6.MC-338 cargo tanks

(b)Fixed facility tanks:
1.Nonpressure tank
2.Pressure tank

(c)Intermodal tanks:
1.Nonpressure intermodal tanks:
a.IM- 101 portable tank
b.IM-102 portable tank
2.Pressure intermodal tanks (specification 51)
3.Specialized intermodal tanks:
a.Cryogenic intermodal tanks
b.Tube modules

(d)One-ton containers
(e)Pipelines
(f)Railroad cars:
1.Cryogenic liquid tank cars
2.High-pressure tube cars
3.Nonpressure tank cars
4.Pneumatically unloaded hopper cars
5.Pressure tank cars

(g)Intermediate bulk containers (also known as tote tanks)

TECH-4.1.2
NFPA 4-2.3.1.2
OSHA TECH-E

Identify the basic design and construction features including closures of the following nonbulk containers:

(a)Carboys
(b)Drums
(c)Pressurized cylinders

TECH-4.1.3
NFPA 4-2.3.1.3
OSHA TECH-E

Identify the basic design and construction features of the following radioactive materials containers:

(a)Type A package
(b)Type B package

TECH-4.1.4
NFPA 4-2.3.1.6
(See Special Topics: Terrorism)

Demonstrate a method for collecting samples of the following:
(a)liquid
(b)solid
(c)gas

TECH-4.2
NFPA 4-2.3.2
OSHA TECH-E

Describe how a liquid pipeline can carry different products.

TECH-4.3
NFPA 4-2.3.3
OSHA TECH-E

Given an example of a pipeline, identify the following:
(a)Ownership of the line
(b)Procedures for checking for gas migration
(c)Procedure for shutting down the line or controlling the leak
(d)Type of product in the line

TECH-4.4
NFPA 4-2.3.4
OSHA TECH-E

Identify the types of damage that a pressure container could incur.

TECH-4.5
NFPA 4-2.3.5
OSHA TECH-E

Given examples of tank car damage, identify the type of damage in each example by name.

Analyzing the Incident
Predicting Likely Behavior of Materials and Their Containers When Multiple Materials are Involved

TECH-5
NFPA 4-2.4
OSHA TECH-E

Given examples of both facility and transportation incidents involving multiple hazardous materials, predict the likely behavior of the material in each case.

TECH-5.1
NFPA 4-2.4.1
OSHA TECH-E

Identify at least three resources available that indicate the effects of mixing various hazardous materials.

TECH-5.2
NFPA 4-2.4.2
OSHA TECH-E

Identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk storage facility and explain their significance in the risk assessment process:
(a)Fire protection systems
(b)Monitoring and detection systems
(c)Product spillage and control (impoundment and diking)
(d)Tank spacing
(e)Tank venting and flaring systems
(f)Transfer operations

Analyzing the Incident
Estimating the Likely Size of an Endangered Area

TECH-6
NFPA 4-2.5
OSHA TECH-E

Given various facility and transportation hazardous materials incidents, estimate the likely size, shape, and concentrations associated with the release of materials involved in the incident by using computer modeling, monitoring equipment, or specialists in this field.

TECH-6.1
NFPA 4-2.5.1
OSHA TECH-E

Identify local resources for dispersion pattern prediction and modeling including computers, monitoring equipment, or specialists in the field.

TECH-6.2
NFPA 4-2.5.2
OSHA TECH-E

Given the concentrations of the released material, identify the steps for determining the extent of the hazards (e.g., physical, safety, and health) within the endangered area of a hazardous materials incident.

TECH-6.2.1
NFPA 4-2.5.2.1
OSHA TECH-I

Describe the following toxicological terms and exposure values and explain their significance in the risk assessment process:
(a)Parts per million (ppm)
(b)Parts per billion (ppb)
(c)Lethal dose (LD_{50})
(d)Lethal concentrations (LC_{50})
(e)Permissible exposure limit (PEL)
(f)Threshold limit value time-weighted average (TLV-TWA)
(g)Threshold limit value short-term exposure limit (TLV-STEL)
(h)Threshold limit value ceiling (TLV-C)
(i)Immediately dangerous to life and health value (IDLH)

TECH-6.2.2
NFPA 4-2.5.2.2
OSHA TECH-E,I

Describe the following radiological terms and explain their significance in predicting the extent of health hazards and environmental impact in a hazardous materials incident:
(a)Types
(b)Measurement
(c)Protection

TECH-6.2.3
NFPA 4-2.5.2.3
OSHA TECH-E,I

Identify two methods for predicting the areas of potential harm within the endangered area of a hazardous materials incident.

TECH-6.3
NFPA 4-2.5.3
OSHA TECH-E,I

Identify a method for estimating the outcomes within an endangered area of a hazardous materials incident.

Planning the Response
Identifying Response Objectives

TECH-7
NFPA 4-3.1
OSHA TECH-F

Given simulated facility and transportation problems, describe the response objectives for each problem and describe the steps for determining response objectives (defensive, offensive, nonintervention) given an analysis of a hazardous materials incident.

Planning the Response
Identifying the Potential Action Options

TECH-8
NFPA 4-3.2
OSHA TECH-F

Given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and nonintervention) by response objective for each problem and identify the possible action options to accomplish a given response objective.

Planning the Response
Selecting Personal Protective Equipment

TECH-9
NFPA 4-3.3
OSHA TECH-D
OSHA I.C.-B.2

Given situations with known and unknown hazardous materials, determine the appropriate personal protective equipment for the action options specified in the plan of action in each situation.

TECH-9.1
NFPA 4-3.3.1
OSHA TECH-D

Identify the four levels of personal protective equipment (EPA/NIOSH or NFPA 471) and describe the equipment for each level and the condition under which each level is used.

TECH-9.2
NFPA 4-3.3.2
OSHA TECH-D
OSHA I.C.-C.1

Identify the factors to be considered in selecting the proper respiratory protection for a specified action option.

TECH-9.2.1
NFPA 4-3.3.2.1
OSHA TECH-D
OSHA I.C.-B.2,C.1

Describe the advantages, limitations, and proper use of the following types of respiratory protection at hazardous materials incidents:
(a)Positive pressure self-contained breathing apparatus
(b)Positive pressure air line respirators with required escape unit
(c)Air purifying respirators

TECH-9.2.2
NFPA 4-3.3.2.2
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the process for selecting the proper respiratory protection at hazardous materials incidents.

TECH-9.2.3
NFPA 4-3.3.2.3
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the operational components of air purifying respirators and air line respirators by name and describe their functions.

TECH-9.3
NFPA 4-3.3.3
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the factors to be considered in selecting the proper chemical-protective clothing for a specified action option.

TECH-9.3.1
NFPA 4-3.3.3.1
OSHA TECH-D,I

Describe the following terms and explain their impact and significance on the selection of chemical-protective clothing:
(a)Degradation
(b)Penetration
(c)Permeation

TECH-9.3.2
NFPA 4-3.3.3.2
OSHA TECH-D,I

Identify at least three indications of material degradation of chemical-protective clothing.

TECH-9.3.3
NFPA 4-3.3.3.3
OSHA TECH-D,I

Identify the three types of vapor-protective and splash-protective clothing and describe the advantages and disadvantages of each type.

TECH-9.3.4
NFPA 4-3.3.3.4
OSHA TECH-D

Identify the relative advantages and disadvantages of the following heat exchange units used for the cooling of personnel in chemical-protective clothing:
(a)Air cooled
(b)Ice cooled
(c)Water cooled

TECH-9.3.5
NFPA 4-3.3.3.5
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the process for selecting the proper protective clothing at hazardous materials incidents.

TECH-9.3.6
NFPA 4-3.3.3.6
OSHA TECH-D
OSHA I.C.-B.2

Given three examples of various hazardous materials, determine the appropriate protective clothing construction materials for a given action option using chemical compatibility charts.

TECH-9.3.7
NFPA 4-3.3.3.7
OSHA TECH-D
OSHA I.C.-C

Identify the physical and psychological stresses that can affect users of specialized protective clothing.

Planning the Response
Developing Appropriate Decontamination Procedures

TECH-10
NFPA 4-3.4
OSHA TECH-A,G

Given a simulated hazardous materials incident, select an appropriate decontamination procedure and determine the equipment required to implement that procedure.

TECH-10.1
NFPA 4-3.4.1
OSHA TECH-A,G

Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used: (a) Absorption; (b) Adsorption; (c) Chemical degradation; (d) Dilution; (e) Disposal; (f) Evaporation; (g) Neutralization; (h) Solidification; (i) Vacuuming; and (j) Washing.

TECH-10.2
NFPA 4-3.4.2
OSHA TECH-A,G

Identify three sources of technical information for selecting appropriate decontamination procedures and identify how to contact those sources in an emergency.

Planning the Response
Developing a Plan of Action

TECH-11
NFPA 4-3.5
OSHA TECH-F
OSHA I.C.-A,B,C,D

Given simulated hazardous materials incidents in facility and transportation settings, develop a plan of action, including safety considerations, which are consistent with the local emergency response plan and the organization's standard operating procedures and are within the capability of available personnel, personal protective equipment, and control equipment for that incident.

TECH-11.1
NFPA 4-3.5.1
OSHA TECH-F

Describe the purpose of, procedures for, equipment required, and safety precautions used with the following techniques for hazardous materials control:
(a)Absorption
(b)Neutralization
(c)Overpacking
(d)Patching
(e)Plugging

TECH-11.2
NFPA 4-3.5.2
OSHA TECH-F

Given MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks, identify the common methods for product transfer from each type of cargo tank.

TECH-11.3
NFPA 4-3.5.3
OSHA TECH-F
OSHA HMSPEC-H

Given a simulated hazardous materials incident, develop the safety considerations that must be included in the plan of action.

TECH-11.3.1
NFPA 4-3.5.3.1
OSHA TECH-F
OSHA HMSPEC-H

List and describe the safety considerations to be included.

TECH-11.3.2
NFPA 4-3.5.3.2
OSHA TECH-F
OSHA HMSPEC-H

Identify the points that should be made in a safety briefing prior to working at the scene.

TECH-11.4
NFPA 4-3.5.4
OSHA TECH-F

Identify the atmospheric and physical safety hazards associated with hazardous materials incidents involving confined spaces.

TECH-11.5
NFPA 4-3.5.5
OSHA TECH-F

Identify the pre-entry activities to be performed.

TECH-11.6
NFPA 4-3.5.6
OSHA TECH-F
(See Special Topics: Terrorism)

Identify the procedures, equipment, and safety precautions for collecting legal evidence at hazardous materials incidents.

Implementing the Planned Response
Performing Incident Management Duties

TECH-12
NFPA 4-4.1
OSHA TECH-C,H

Given the local emergency response plan or organization's standard operating procedures and a simulated hazardous materials incident, demonstrate the duties of an assigned hazardous materials branch position within the local incident management system (IMS).

TECH-12.1
NFPA 4-4.1.1
OSHA TECH-C,H

Identify the role of the hazardous materials technician during an incident involving hazardous materials.

TECH-12.2
NFPA 4-4.1.2
OSHA I.C.-A,A.1,B,B.1,D

Identify the duties and responsibilities of the following hazardous materials branch functions within the incident management system:
(a)Backup
(b)Decontamination
(c)Entry
(d)Hazardous Materials Branch Management
(e)Hazardous Materials Branch Safety
(f)Information/research
(g)Reconnaissance
(h)Resources

TECH-12.3
NFPA 4-4.1.3
OSHA TECH-A,C,G
OSHA HMSPEC-G

Given a simulated hazardous materials incident, demonstrate setup of the decontamination corridor as specified in the planned response.

TECH-12.4
NFPA 4-4.1.4
OSHA TECH-A,G

Given a simulated hazardous materials incident, demonstrate the decontamination process specified in the planned response.

Implementing the Planned Response
Using Protective Clothing and Respiratory Protection

TECH-13
NFPA 4-4.2
OSHA TECH-D

Demonstrate the ability to don, work in, and doff both liquid splash- and vapor-protective chemical-protective clothing and any other specialized personal protective equipment provided by the authority having jurisdiction, including the appropriate respiratory protection.

TECH-13.1
NFPA 4-4.2.1
OSHA TECH-A,D

Describe three safety procedures for personnel wearing vapor-protective clothing.

TECH-13.2
NFPA 4-4.2.2
OSHA TECH-A,D

Describe three emergency procedures for personnel wearing vapor-protective clothing.

TECH-13.3
NFPA 4-4.2.3
OSHA TECH-D
OSHA 29 CFR 1910.134

Identify the procedures for donning, working in, and doffing the following types of respiratory protection:
(a)Air line respirator with required escape unit
(b)Air purifying respirator

TECH-13.4
NFPA 4-4.2.4
OSHA TECH-D

Demonstrate donning, working in, and doffing chemical-protective clothing in addition to any other specialized protective equipment provided by the authority having jurisdiction.

TECH-13.5
NFPA 4-4.2.5
OSHA TECH-D
OSHA (q)(10)

Demonstrate the ability to record the use, repair, and testing of chemical-protective clothing according to manufacturer's specifications and recommendations.

TECH-13.6
NFPA 4-4.2.6
OSHA TECH-A
OSHA (q)(10)

Describe the maintenance, testing, inspection, and storage procedures for personal protective equipment provided by the authority having jurisdiction according to the manufacturer's specifications and recommendations.

Implementing the Planned Response
Performing Control Functions Identified in Plan of Action

TECH-14
NFPA 4-4.3
OSHA TECH-F

Given various simulated hazardous materials incidents involving nonbulk and bulk packaging and facility containers, select the tools, equipment, and materials for the control of hazardous materials incidents and identify the precautions for controlling releases from those packaging/containers.

TECH-14.1
NFPA 4-4.3.1
OSHA TECH-F

Given a pressure vessel, select the appropriate material or equipment and demonstrate a method(s) to contain leaks from the following locations:
(a)Fusible metal of plug
(b)Fusible plug threads
(c)Side wall of cylinder
(d)Valve blowout
(e)Valve gland
(f)Valve inlet threads
(g)Valve seat
(h)Valve stem assembly blowout

TECH-14.2
NFPA 4-4.3.2
OSHA TECH-F

Given the fittings on a pressure container, demonstrate the ability to perform the following:
(a)Close valves that are open
(b)Replace missing plugs
(c)Tighten loose plugs

TECH-14.3
NFPA 4-4.3.3
OSHA TECH-F

Given a 55-gal (208-L) drum, demonstrate the ability to contain the following types of leaks using appropriate tools and materials:
(a)Bung leak
(b)Chime leak
(c)Forklift puncture
(d)Nail puncture

TECH-14.4
NFPA 4-4.3.4
OSHA TECH-F

Given a 55-gal (208-L) drum and an overpack drum, demonstrate the ability to place the 55-gal drum into the overpack drum using the following methods:
(a)Rolling slide-in
(b)Slide-in
(c)Slip-over

TECH-14.5
NFPA 4-4.3.5
OSHA TECH-A,F

Identify the maintenance and inspection procedures for the tools and equipment provided for the control of hazardous materials releases according to the manufacturer's specifications and recommendations.

TECH-14.6
NFPA 4-4.3.6
OSHA TECH-E

Identify three considerations for assessing a leak or spill inside a confined space without entering the area.

TECH-14.7
NFPA 4-1.3
OSHA TECH-A,E,F

Identify three safety considerations for product transfer operations.

TECH-14.8
NFPA 4-4.3.8
OSHA TECH-F

Given an MC-306/DOT-406 cargo tank and a dome cover clamp, demonstrate the ability to install the clamp on the dome properly.

TECH-14.9
NFPA 4-4.3.9
OSHA TECH-A,E,F

Identify the methods and precautions used when controlling a fire involving an MC-306/DOT-406 aluminum shell cargo tank.

TECH-14.10
NFPA 4-4.3.10
OSHA TECH-A,E,F

Describe at least one method for containing each of the following types of leaks in MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT- 412 cargo tanks:
(a)Dome cover leak
(b)Irregular-shaped hole
(c)Puncture
(d)Split or tear

TECH-14.11
NFPA 4-4.3.11
OSHA TECH-A,E,F

Describe three product removal and transfer considerations for overturned MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks.

Evaluating Progress
Evaluating the Effectiveness of the Control Functions

TECH-15
NFPA 4-5.1
OSHA TECH-A,E,F

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging and the plan of action, evaluate the effectiveness of any control functions identified in the plan of action.

Terminating the Incident
Assisting in the Debriefing

TECH-16
NFPA 4-6.1
OSHA TECH-H

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, participate in the debriefing of the incident.

TECH-16.1
NFPA 4-6.1.1
OSHA TECH-H

Describe three components of an effective debriefing.

TECH-16.2
NFPA 4-6.1.2
OSHA TECH-H

Describe the key topics of an effective debriefing.

TECH-16.3
NFPA 4-6.1.3
OSHA TECH-H

Describe when a debriefing should take place.

TECH-16.4
NFPA 4-6.1.4
OSHA TECH-H

Describe who should be involved in a debriefing.

Terminating the Incident
Assisting in the Incident Critique

TECH-17
NFPA 4-6.2
OSHA TECH-H

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, provide operational observations of the activities that were performed in the hot and warm zones during the incident.

TECH-17.1
NFPA 4-6.2.1
OSHA TECH-H

Describe three components of an effective critique.

TECH-17.2
NFPA 4-6.2.2
OSHA TECH-H

Describe who should be involved in a critique.

TECH-17.3
NFPA 4-6.2.3
OSHA TECH-H

Describe why an effective critique is necessary after a hazardous materials incident.

TECH-17.4
NFPA 4-6.2.4
OSHA TECH-H

Describe which written documents should be prepared as a result of the critique.

Terminating the Incident
Providing Reports and Documentation

TECH-18
NFPA 4-6.3
OSHA TECH-A,H

Given a simulated hazardous materials incident, complete the reporting and documentation requirements consistent with the organization's emergency response plan and standard operating procedures.

TECH-18.1
NFPA 4-6.3.1
OSHA TECH-A,H

Identify the reports and supporting documentation required by the local emergency response plan and the organization's standard operating procedures.

TECH-18.2
NFPA 4-6.3.2
OSHA TECH-A,H

Demonstrate the proper completion of the reports required by the local emergency response plan and the organization's standard operating procedures.

TECH-18.3
NFPA 4-6.3.3
OSHA TECH-A,H

Describe the importance of personnel exposure records.

TECH-18.4
NFPA 4-6.3.4
OSHA TECH-A,H

Describe the importance of debriefing records.

TECH-18.5
NFPA 4-6.3.5
OSHA TECH-A,H

Describe the importance of critique records.

TECH-18.6 NFPA 4-6.3.6 *OSHA TECH-A,H*	Identify the steps in keeping an activity log and exposure records.
TECH-18.7 NFPA 4-6.3.7 *OSHA TECH-A,H*	Identify the steps to be taken in compiling incident reports that meet federal, state, local, and organizational requirements.
TECH-18.8 NFPA 4-6.3.8 *OSHA TECH-A,H*	Identify the requirements for compiling hot zone entry and exit logs.
TECH-18.9 NFPA 4-6.3.9 *OSHA TECH-A,H*	Identify the requirements for compiling personal protective equipment logs.
TECH-18.10 NFPA 4-6.3.10 *OSHA TECH-A,H*	Identify the requirements for filing documents and maintaining records.

Hazardous Materials

Incident Response Training Guidelines

On-Scene Incident Commander

General Training Considerations

Introduction

In title 29 of the Code of Federal Regulations, 1910. 120 (q)(6)(v), OSHA sets the minimum level of training and competencies required for incident commanders. Incident commanders who will assume control of the incident scene beyond the first responder at the awareness level shall receive at least 24 hours of training equal to the first responder at the operations level as well as training to the competencies defined in this section. The U.S. Environmental Protection Agency, individual States, and local agencies may require that incident commanders have additional training or competencies, such as those competencies defined in 29 CFR 1910.120(q)(3).

Definition

The incident commander is the person responsible for all decisions relating to the management of an incident and is in charge of the incident site. This is the equivalent to the on-scene incident commander as defined by OSHA 1910,120.

Audience

Incident commanders may be employed by public emergency response or private agencies that may respond to hazardous materials incidents. They are typically employees of law enforcement agencies, fire departments, emergency medical responders, emergency management agencies, public works departments, or any other agencies that may be expected to take the lead responsibility at a hazardous material incident.

Methodology Recommendations

Hazardous materials incident commander training should include a combination of traditional classroom lecture with small-group activities and large group field exercises. Training can range from 16 to 40 hours in length. Small-group classroom activities focusing on using the incident command system should be progressive in terms of incident complexity and resource management complexity. Table-top, field exercises, or large group incident scene simulations are optimal for overall command structure practice to develop effective incident management skills. For proper skill development during scenario practice, it is essential that there be proper critiques and corrective instructions of incident resource organization, style, and choice of delegation of command responsibilities, management of communication systems, and transfer of command. Testing and evaluation consist of a written examination and post-incident critique of simulations, including solutions to small-group activities and field exercises. Refresher training should include review of command structure SOP's, technical updates on State and federal response plans, and field exercise practice performing command roles in simulated emergencies.

SUMMARY: Incident Commander

OSHA requirement=24 hours Operations training + Incident Commander training

Audience	Prerequisites	Training	Refresher
Moderate in size. Responders whose level of command responsibility may include incident commander at all phases of a hazmat incident, from initial response through stabilization to incident termination.	1. First Responder Awareness training. 2. First Responder Operations training (min. 24 hours required).	- 16-40 hours. - Classroom and simulator/field instruction, with emphasis on incident management and resource coordination. - Competencies: - Knowledge of role of incident commander within incident command system and responsibilities within employer's emergency response plan. - Knowledge of State and federal emergency response plans. - Ability to manage and coordinate a hazmat incident response, including supervising hazard and risk assessment, coordinating control, containment and confinement operations, ensuring proper use of personal protective equipment, employing proper notification procedures, and ensuring correct decontamination procedures. - Ability to implement transfer of command and incident termination procedures.	1. Review of command structure SOP's. 2. Information updates on State and federal response plans. 3. Refresher practice incident scene management, coordination and decision-making using simulated emergencies.

Federal Requirements

For Incident Commander Training

OSHA establishes the following training requirements for incident commanders: a minimum of 24 hours of training at the first responder operations level plus training to the competencies described below or certification of sufficient experience as an alternative. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(v)
ON-SCENE INCIDENT COMMANDER

Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify.

- *(A) Know and be able to implement the employers incident command system*
- *(B) Know how to implement the employers emergency response plan*
- *(C) Know and understand the hazards and risks associated with employees working in chemical protective clothing*
- *(D) Know how to implement the local emergency response plan*
- *(E) Know of the state emergency response plan and of the Federal Regional Response Team*
- *(F) Know and understand the importance of decontamination procedures*

The following are additional OSHA requirements that must be reflected in the development of training objectives.

OSHA 29 CFR 1910.120(q)(3)(i-ix)

(i) The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS assisted by the senior official present for each employer.

Note to (q)(3)(i)- The "senior official" at an emergency response is the most senior official on the site who has the responsibility for controlling the operations at the site. Initially it is the senior officer on the first- due piece of responding emergency apparatus to arrive on the incident scene. As more senior officials arrive (i.e., battalion chief, fire chief, State law enforcement official, state coordinator, etc.) the position is passed up the line of authority which has been previously established.

(ii) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.

(iii) Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations., and assure that the personal protective equipment worn is appropriate for the hazards to be encountered. However, personal protective equipment shall meet, at a minimum, the criteria contained in 29 CFR 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage for any incident.

(iv) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in the emergency response, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees.

Continued on next page

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(v) The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to the incident or site hazards, to those who are actively performing emergency operations. However, operations in hazardous areas shall be performed using the buddy system in groups of two or more.

(vi) Back-up personnel shall stand by with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, shall also be standing by with medical equipment and transportation capability.

(vii) The individual in charge of the ICS shall designate a safety officer, who is knowledgeable in the operations being implemented at the emergency response site, with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

(viii) When activities are judged by the safety officer to be an IDLH and/or involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any action needed to be taken to correct these hazards at the emergency scene.

(ix) After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.

See also OSHA 29 CFR 1910.120 Appendix C, Compliance Guidelines (6) in ICS and (7*)* Site Safety and Control Plans.

The safety and security of response personnel and others in the area of an emergency response incident site should be of primary concern of the incident commander. The use of a site safety and control plan could greatly assist those in charge of assuring the safety and health of employees on the site.

A comprehensive site safety and control plan should include the following: summary analysis of hazards on the site and risk analysis of those hazards; site map or sketch; site work zones (clean zone transition or decontamination zone, work or hot zone); use of the buddy system; site communications; command post or command center; standard operating procedures and safe work practices; medical assistance and triage area; hazard monitoring plan (air contamination monitoring, etc.); decontamination procedures and area; and other relevant areas. This plan should be part of the employer's emergency response plan or an extension of it to the specific site.

Required Training can be translated directly into the following six sample objectives:

Identification	*Sample **Required** Training Objectives*
OSHA I.C.-A	Given a simulated incident involving hazardous materials, demonstrate implementation of the employer's incident command system.
OSHA I.C.-A.1	Demonstrate establishing command, organizing resources and assigning subordinate units and personnel, and establishing lines of communication.- OSHA 29 CFR 1910.120(q)(3)(i)
OSHA I.C.-A.2	Demonstrate transfer of command.- Note to OSHA 29 CFR 1910.120(q)(3)(i)
OSHA I.C.-A.3	Define the roles and responsibilities of the safety officer.- OSHA 29 CFR 1910.120 (q)(3)(vii and viii)
OSHA I.C.-B	Given a simulated incident involving hazardous materials, demonstrate implementation of the employer's emergency response plan.
OSHA I.C.-B.1	Identify all hazardous substances or conditions present and describe as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies. OSHA 29 CFR 1910.120(q)(3)(ii)
OSHA I.C.-B.2	Determine and describe appropriate emergency operations, including correct use of personal protective equipment, based on the hazardous substance and/or conditions present. OSHA 29 CFR 1910.120(q)(3)(iii)
OSHA I.C.-C	Given a simulated incident involving hazardous materials, identify the hazards and risks associated with employees working in chemical protective clothing.
OSHA I.C.-C.1	Identify the process to determine, through the use of air monitoring, when it is safe for subordinate personnel to discontinue use of positive pressure self-contained breathing apparatus. OSHA 29 CFR 1910.120(q)(3)(iv)
OSHA I.C.-C.2	Identify strategies and tactics to minimize the number of emergency response personnel working in areas of potential or actual exposure to incident or site hazards, while using the buddy system in groups of two or more. OSHA 29 CFR 1910.120(q)(3)(v)
OSHA I.C.-C.3	Identify requirements for backup assistance and rescue personnel and qualified basic life support personnel, equipment, and transportation capability. OSHA 29 CFR 1910.120(q)(3)(vi)
OSHA I.C.-D	Given a simulated incident involving hazardous materials, demonstrate implementation of the local emergency response plan.
OSHA I.C.-E	Identify and describe the State emergency response plan and the federal regional response team.
OSHA I.C.-F	Given a simulated incident involving hazardous materials, identify and demonstrate management of decontamination procedures.

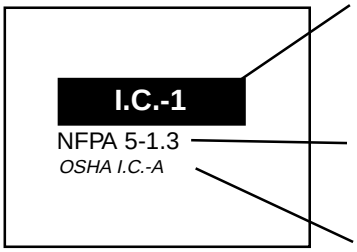
Recommended Training

Recommended Training
For Incident Commander

The following training objectives are recommended for on-scene incident commander training. The incident commander is responsible for directing and coordinating all aspects of a hazards materials incident. The primary source for the material is NFPA 472, Chapter 5: Competencies for the Incident Commander. Training objectives from other sources are so noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

In general, these objectives are comparable in scope to those minimally required by OSHA. They do not constitute an increased scope of training but rather provide greater depth of definition of trainee objectives and may suggest a greater length of training. To assist in assessing course compliance with OSHA 1910.120(q), the relationship between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.

The incident commander should be trained to meet all requirements indicated for the first responder at the awareness and operational levels as well as the requirements defined below. In addition, the incident commander should receive any additional training necessary to meet OSHA, local occupational health and safety regulations, or EPA requirements, whichever is appropriate for his or her jurisdiction.



Objective Identification Legend

This is the identification of the objective in this document. It matches the identification code used in course assignment references. Decimal numbers (such as I.C.-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of the objective. Usually it is directly from NFPA. In some cases, other source are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 1910.120(q)(6)(v)(A-F)= OSHA I.C.-A to F

OSHA 29 CFR 1910.120(q)(3)(i-ix) are subsumed under OSHA I.C.-A to F

Identification	***Recommended** Training Objectives*
I.C.-1 NFPA 5-1.3 *OSHA I.C.-A to F*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the incident commander.
I.C.-1.1 NFPA 5-1.3(a) *OSHA I.C.-A,B,D*	Describe the responsibility to analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes.
I.C.-1.1.1 NFPA 5-1.3(a)1 *OSHA I.C.-A,B,D*	Identify the responsibility to collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment.

I.C.-1.1.2 NFPA 5-1.3(a)2 *OSHA I.C.-A,B,D*	Identify the responsibility to estimate the potential outcomes within the endangered area at a hazardous materials incident.
I.C.-1.2 NFPA 5-1.3(b) *OSHA I.C.-A,B,D*	Describe the responsibility to plan response operations within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
I.C.-1.2.1 NFPA 5-1.3(b)1 *OSHA I.C.-A,B,D*	Identify the response objectives for hazardous materials incidents.
I.C.-1.2.2 NFPA 5-1.3(b)2 *OSHA I.C.-A,B,D*	Identify the potential action options (defensive, offensive, and nonintervention) available by response objective.
I.C.-1.2.3 NFPA 5-1.3(b)3 *OSHA I.C.-A,B,D*	Identify the responsibility to approve the level of personal protective equipment required for a given action option.
I.C.-1.2.4 NFPA 5-1.3(b)4 *OSHA I.C.-A,B,D*	Identify the responsibility to develop a plan of action, including safety considerations consistent with the local emergency response plan and the organization's standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment.
I.C.-1.3 NFPA 5-1.3(c) *OSHA I.C.-A,B,D*	Describe the responsibility to implement a response to favorably change the outcome consistent with the local emergency response plan and the organization's standard operating procedures.
I.C.-1.3.1 NFPA 5-1.3(c)1 *OSHA I.C.-A,B,D*	Identify the responsibility to implement an incident management system (IMS), including the specified procedures for notification and utilization of nonlocal resources, e.g., private, state, and federal government personnel.
I.C.-1.3.2 NFPA 5-1.3(c)2 *OSHA I.C.-A,B,D*	Identify the responsibility to direct resources (private, governmental, and others) with expected task assignments and on-scene activities and provide management overview, technical review, and logistical support to private and governmental sector personnel.
I.C.-1.3.3 NFPA 5-1.3(c)3 *OSHA I.C.-A,B,D*	Identify the responsibility to provide a focal point for information transfer to media and local elected officials through the IMS structure.
I.C.-1.4 NFPA 5-1.3(d) *OSHA I.C.-A,B,D*	Describe the responsibility to evaluate the progress of the planned response to ensure the response objectives are being met safely, effectively, and efficiently and adjust the plan of action accordingly by evaluating the effectiveness of the control functions.
I.C.-1.5 NFPA 5-1.3(e) *OSHA I.C.-A,B,D*	Describe the responsibility to terminate the incident.
I.C.-1.5.1 NFPA 5-1.3(e)1 *OSHA I.C.-A,B,D*	Identify the responsibility to transfer command (control) when appropriate.

I.C.-1.5.2
NFPA 5-1.3(e)2
OSHA I.C.-A,B,D

Identify the responsibility to conduct an incident debriefing.

I.C.-1.5.3
NFPA 5-1.3(e)3
OSHA I.C.-A,B,D

Identify the responsibility to conduct a multi-agency critique.

I.C.-1.5.4
NFPA 5-1.3(e)4
OSHA I.C.-A,B,D

Identify the responsibility to report and document the hazardous materials incident and submit the report to the proper entity.

Analyzing the Incident
Collecting and Interpreting Hazard and Response Information

I.C.-2
NFPA 5-2.1
OSHA I.C.-B.1

Given access to printed and technical resources, computer data bases, and monitoring equipment, collect and interpret hazard and response information not available from the current edition of the *North American Emergency Response Guidebook* or a material safety data sheet (MSDS) and identify and interpret the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

(a)Reference manuals
(b)Hazardous materials data bases
(c)Technical information centers
(d)Technical information specialists
(e)Monitoring equipment

Analyzing the Incident
Estimating Potential Outcomes

I.C.-3
NFPA 5-2.2
OSHA I.C.-B.1

Given simulated facility or transportation incidents involving hazardous materials, the surrounding conditions, and the predicted behavior of the container and its contents, estimate the potential outcomes within the endangered area.

I.C.-3.1
NFPA 5-2.2.1
OSHA I.C.-B.1

Identify the steps for estimating the number of exposures within the endangered area.

I.C.-3.2
NFPA 5-2.2.2
OSHA I.C.-B.1

Describe the following toxicological terms and exposure values and explain their significance in the risk assessment process:

(a)Parts per million (ppm)
(b)Parts per billion (ppb)
(c)Lethal dose (LD_{50})
(d)Lethal concentrations (LC_{50})
(e)Permissible exposure limit (PEL)
(f)Threshold limit value time-weighted average (TLV-TWA)
(g)Threshold limit value short-term exposure limit (TLV-STEL)
(h)Threshold limit value ceiling (TLV-C)
(i)Immediately dangerous to life and health value (IDLH)

I.C.-3.3
NFPA 5-2.2.3
OSHA I.C.-B.1

Describe the following radiological materials terms and explain their significance in predicting the extent of health hazards and environmental impact in a hazardous materials incident:
(a)Types
(b)Measurement
(c)Protection

I.C.-3.4
NFPA 5-2.2.4
(See Special Topics: Terrorism)

Describe the health risks associated with the following:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Blood agents
(d)Choking agents
(e)Biological agents and toxins
(f)Irritants (riot control agents).

See Special Topics: Terrorism for NFPA detailed examples.

I.C.-3.5
NFPA 5-2.2.5
OSHA I.C.-B.1

Identify two methods for predicting the areas of potential harm within the endangered area of a hazardous materials incident.

I.C.-3.6
NFPA 5-2.2.6
OSHA I.C.-B.1

Identify the methods available to the organization for obtaining local weather conditions and predictions for short-term future weather changes.

I.C.-3.7
NFPA 5-2.2.7
OSHA I.C.-B.1,B.2

Explain the basic toxicological principles relative to assessment and treatment of personnel exposed to hazardous materials, including the following:
(a)Acute and delayed toxicity (chronic)
(b)Routes of exposure to toxic materials
(c)Local and systemic effects
(d)Dose response
(e)Synergistic effects

Planning the Response
Identifying Response Objectives

I.C.-4
NFPA 5-3.1
OSHA I.C.-B.2

Given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and nonintervention) by response objectives for each problem and describe the steps for determining response objectives (defensive, offensive, and nonintervention) given an analysis of a hazardous materials incident.

Planning the Response
Identifying the Potential Action Options

I.C.-5
NFPA 5-3.2
OSHA I.C.-B.2

Given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and non-intervention) by response objective for each problem.

I.C.-5.1
NFPA 5-3.2.1
OSHA I.C.-B.2

Identify the possible action options to accomplish a given response objective.

I.C.-5.2
NFPA 5-3.2.2
OSHA I.C.-B.2

Identify the purpose of each of the following techniques for hazardous materials control:
(a)Absorption
(b)Neutralization
(c)Overpacking
(d)Patching
(e)Plugging

Planning the Response
Approving the Level of Personal Protective Equipment

I.C.-6
NFPA 5-3.3
OSHA I.C.-C

Given situations with known and unknown hazardous materials, approve the appropriate personal protective equipment for the action options specified in the plan of action in each situation.

I.C.-6.1
NFPA 5-3.3.1
OSHA I.C.-B.2,C,C.1

Identify the four levels of chemical protection (EPA/NIOSH) and describe the equipment required for each level with the conditions under which each level is used.

I.C.-6.2
NFPA 5-3.3.2
OSHA I.C.-C

Describe the following terms and explain their impact and significance on the selection of chemical- protective clothing:
(a)Degradation
(b)Penetration
(c)Permeation

I.C.-6.3
NFPA 5-3.3.3
OSHA I.C.-C

Describe three safety considerations for personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.

I.C.-6.4
NFPA 5-3.3.4
OSHA I.C.-C

Identify the physical and psychological stresses that can affect users of personal protective equipment.

I.C.-6.5
NFPA 5-3.3.5
(See Special Topics: Terrorism)

Identify the limitations of military chemical/biological protective clothing.

Planning the Response
Developing a Plan of Action

I.C.-7
NFPA 5-3.4
OSHA I.C.-A,A.1,B.1

Given simulated facility and transportation hazardous materials incidents, develop a plan of action consistent with the local emergency response plan and the organization's standard operating procedures that is within the capability of the available personnel, personal protective equipment, and control equipment.

I.C.-7.1
NFPA 5-3.4.1
OSHA I.C.-B,D

Identify the steps for developing a plan of action.

I.C.-7.2
NFPA 5-3.4.2
OSHA I.C.-B,D

Identify the factors to be evaluated in selecting public protective actions including evacuation and sheltering in-place.

I.C.-7.3
NFPA 5-3.4.3
OSHA I.C.-A,B,D,E
(See Special Topics: Terrorism)

Given the local emergency response plan and/or the organization's standard operating procedures, identify which agency will perform the following:

(a)Receive the initial notification
(b)Provide secondary notification and activation of response agencies
(c)Make ongoing assessments of the situation
(d)Command on-scene personnel (incident management system)
(e)Coordinate support and mutual aid
(f)Provide law enforcement and on-scene security (crowd control)
(g)Provide traffic control and rerouting
(h)Provide resources for public safety protective action (evacuation or shelter in-place)
(i)Provide fire suppression services when appropriate
(j)Provide on-scene medical assistance (ambulance) and medical treatment (hospital)
(k)Provide public notification (warning)
(l)Provide public information (news media statements)
(m)Provide on-scene communications support
(n)Provide emergency on-scene decontamination when appropriate
(o)Provide operational-level hazard control services
(p)Provide technician-level hazard mitigation services
(q)Provide environmental remedial action ("cleanup") services
(r)Provide environmental monitoring
(s)Implement on-site accountability
(t)On-site responder identification
(u)Command post security
(v)Crime scene investigation
(w)Evidence collection and sampling

I.C.-7.4
NFPA 5-3.4.4
OSHA I.C.-A

Identify the process for determining the effectiveness of an action option on the potential outcomes.

I.C.-7.5
NFPA 5-3.4.5
OSHA I.C.-A.3,B,C

Identify the safe operating practices/procedures that are required to be followed at a hazardous materials incident.

I.C.-7.5.1
NFPA 5-3.4.5.1
OSHA I.C.-B,C

Identify the importance of pre-incident planning relating to safety during responses to specific sites.

I.C.-7.5.2
NFPA 5-3.4.5.2
OSHA I.C.-A.3,B,C

Identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials incident.

I.C.-7.5.3
NFPA 5-3.4.5.3
OSHA I.C.-A.3,B,C

Identify at least three safety precautions associated with search and rescue missions at hazardous materials incidents.

I.C.-7.5.4
NFPA 5-3.4.5.4
OSHA I.C.-B,C,F

Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used:
(a)Absorption
(b)Adsorption
(c)Chemical degradation
(d)Dilution
(e)Disposal
(f)Evaporation
(g)Neutralization
(h)Solidification
(i)Vacuuming
(j)Washing

I.C.-7.5.5
NFPA 5-3.4.5.5
OSHA I.C.-B,C

Identify the atmospheric and physical safety hazards associated with hazardous materials incidents involving confined spaces.

Implementing the Planned Response
Implementing the Incident Management System

I.C.-8
NFPA 5-4.1
OSHA I.C.-A,A.1,B,B.1,D
(See Special Topics: Recovery and Clean-up)

Given a copy of the local emergency response plan, identify the requirements of the plan, including the required procedures for notification and utilization of nonlocal resources (private, state, and federal government personnel).

I.C.-8.1
NFPA 5-4.1.1
OSHA I.C.-B,D
(See Special Topics: recovery and Clean-up)

Identify the role of the incident commander during an incident involving hazardous materials.

I.C.-8.2
NFPA 5-4.1.2
OSHA I.C.-B,D
(See Special Topics: Recovery and Clean-up)

Identify the duties and responsibilities of the following hazardous materials branch functions within the incident management system:
(a)Backup
(b)Decontamination
(c)Entry
(d)Hazardous Materials Branch Management
(e)Hazardous Materials Branch Safety
(f)Information/research
(g)Reconnaissance
(h)Resources

I.C.-8.3
NFPA 5-4.1.3
OSHA I.C.-B,D,E
(See Special Topics: Recovery and Clean-up)

Identify the steps for implementing the local and related emergency response plans as required under SARA Title III (EPCRA) Section 303 of the federal regulations or other state and local emergency response planning legislation.

I.C.-8.4
NFPA 5-4.1.4
OSHA I.C.-D
(See Special Topics: Recovery and Clean-up)

Given the local emergency response planning documents, identify the elements of each of the documents.

I.C.-8.5
NFPA 5-4.1.5
OSHA I.C.-A
(See Special Topics: Recovery and Clean-up)

Identify the elements of the incident management system necessary to coordinate response activities at hazardous materials incidents.

I.C.-8.6
NFPA 5-4.1.6
OSHA I.C.-D,E
(See Special Topics: Recovery and Clean-up)

Identify the primary local, state, regional, and federal government agencies and identify the scope of their regulatory authority (including the regulations) pertaining to the production, transportation, storage, and use of hazardous materials and the disposal of hazardous wastes.

I.C.-8.7
NFPA 5-4.1.7
OSHA I.C.-B,D,E
(See Special Topics: Recovery and Clean-up)

Identify the government agencies and private sector resources offering assistance during a hazardous materials incident and identify their role and the type of assistance or resources available.

Implementing the Planned Response
Directing Resources (Private and Governmental)

I.C.-9
NFPA 5-4.2
OSHA I.C.-A,A.1,B,B.1,D

Given a simulated hazardous materials incident and the necessary resources to implement the planned response, demonstrate the ability to direct the resources in a safe and efficient manner consistent with the capabilities of those resources.

Implementing the Planned Response
Providing a Focal Point for Information Transfer to Media and Elected Officials

I.C.-10
NFPA 5-4.3
OSHA I.C.-A

Given a simulated hazardous materials incident, identify appropriate information to provide to the media and local, state, and federal officials.

I.C.-10.1
NFPA 5-4.3.1
OSHA I.C.-A

Identify the local policy for providing information to the media.

I.C.-10.2
NFPA 5-4.3.2
OSHA I.C.-A

Identify the responsibilities of the public information officer at a hazardous materials incident.

Evaluating Progress
Evaluating Progress of the Plan of Action

I.C.-11
NFPA 5-5.1
OSHA I.C.-A,B,D

Given simulated facility and transportation hazardous materials incidents, evaluate the progress of the plan of action to determine whether the efforts are accomplishing the response objectives.

I.C.-11.1
NFPA 5-5.1.1
OSHA I.C.-A,B,D

Identify the procedures for evaluating whether the action options are effective in accomplishing the objectives.

I.C.-11.2
NFPA 5-5.1.2
OSHA I.C.-A,B,B.2,D,F

Identify the steps for comparing actual behavior of the material and the container to that predicted in the analysis process.

I.C.-11.3
NFPA 5-5.1.3
OSHA I.C.-A,B,B.2,D,F

Determine the effectiveness of the following:
(a)Personnel being used
(b)Personal protective equipment
(c)Established control zones
(d)Decontamination process

Terminating the Incident
Transferring Command/Control

I.C.-12
NFPA 5-6.1
OSHA I.C.-A.2
Given the details of a simulated incident, the local emergency response plan, and the organization's standard operating procedures, the incident commander shall demonstrate the ability to effectively transfer command.

I.C.-12.1
NFPA 5-6.1.1
OSHA I.C.-A.2
Identify the appropriate steps to be taken to transfer command/control of the incident.

I.C.-12.2
NFPA 5-6.1.2
OSHA I.C.-A.2
Demonstrate the transfer of command/control.

Terminating the Incident
Conducting a Debriefing

I.C.-13
NFPA 5-6.2
OSHA I.C.-A,B,D
Given the details of a simulated hazardous materials incident, the incident commander shall conduct a debriefing of the incident.

I.C.-13.1
NFPA 5-6.2.1
OSHA I.C.-A,B,D
Describe three components of an effective debriefing.

I.C.-13.2
NFPA 5-6.2.2
OSHA I.C.-A,B,D
Describe the key topics in an effective debriefing.

I.C.-13.3
NFPA 5-6.2.3
OSHA I.C.-A,B,D
Describe when a debriefing should take place.

I.C.-13.4
NFPA 5-6.2.4
OSHA I.C.-A,B,D
Describe who should be involved in a debriefing.

I.C.-13.5
NFPA 5-6.2.5
OSHA I.C.-A,B,D
Identify the procedures for conducting incident debriefings at a hazardous materials incident.

Terminating the Incident
Conducting a Multi-Agency Critique

I.C.-14
NFPA 5-6.3
OSHA I.C.-A,B,D
Given details of a simulated multi-agency hazardous materials incident, conduct a critique of the incident.

I.C.-14.1
NFPA 5-6.3.1
OSHA I.C.-A,B,D
Describe three components of an effective critique.

I.C.-14.2
NFPA 5-6.3.2
OSHA I.C.-A,B,D
Describe who should be involved in a critique.

I.C.-14.3 NFPA 5-6.3.3 *OSHA I.C.-A,B,D*	Describe why an effective critique is necessary after a hazardous materials incident.
I.C.-14.4 NFPA 5-6.3.4 *OSHA I.C.-A,B,D*	Describe what written documents should be prepared as a result of the critique.
I.C.-14.5 NFPA 5-6.3.5 *OSHA I.C.-A,B,D*	Implement the procedure for conducting a critique of the incident.

Terminating the Incident

Reporting and Documenting the Hazardous Materials Incident

I.C.-15 NFPA 5-6.4 *OSHA I.C.-A,B,D*	Given a simulated hazardous materials incident, demonstrate the ability to report and document the incident consistent with the local, state, and federal requirements.
I.C.-15.1 NFPA 5-6.4.1 *OSHA I.C.-A,B,D*	Identify the reporting requirements of the federal, state, and local agencies.
I.C.-15.2 NFPA 5-6.4.2 *OSHA I.C.-A,B,D*	Identify the importance of documentation for a hazardous materials incident, including training records, exposure records, incident reports, and critique reports.
I.C.-15.3 NFPA 5-6.4.3 *OSHA I.C.-A,B,D*	Identify the steps in keeping an activity log and exposure records for hazardous materials incidents.
I.C.-15.4 NFPA 5-6.4.4 *OSHA I.C.-A,B,D*	Identify the requirements for compiling hazardous materials incident reports found in the local emergency response plan as well as the organization's standard operating procedures.
I.C.-15.5 NFPA 5-6.4.5 *OSHA I.C.-A,B,D*	Identify the requirements for filing documents and maintaining records found in the local emergency response plan and the organization's standard operating procedures.
I.C.-15.6 NFPA 5-6.4.6 *(See Special Topics: Terrorism)*	Identify the procedures required for legal documentation and chain of custody/continuity described in the organization's standard operating procedure or the local emergency operating plan.

Hazardous Materials

Incident Response Training Guidelines

Hazardous Materials Branch Officer

General Training Considerations

Introduction

The hazardous materials branch officer shall be trained to meet all competencies for the first responder at the awareness, operational, and technician levels and the competencies in this section. They also shall receive any additional training to meet applicable U.S. D.O.T., U.S.E.P.A., O.S.H.A. and other appropriate state, local or provincial occupational health and safety regulatory requirements.

Definition

The hazardous materials branch officer is that person who is responsible for directing and coordinating all operations assigned to the hazardous material branch by the incident commander. This function is akin to that of hazardous materials team leader and encompasses both the general command functions at the branch chief level in an incident command system and in addition includes the responsibility for technical and tactical leadership of the team of hazardous materials technicians at the incident. While the function of hazardous materials branch officer is not directly specified in OSHA 1910.120 or EPA 311, the branch officer function is a natural derivative of the incident command system requirements and incident commander delegation options which are themselves specified as required under the OSHA and EPA regulations for hazardous materials incident response.

Audience

The training audience for hazardous materials branch officer is relatively small in number and is technically advanced. The training audience should include existing members of hazardous materials response teams who have experience and training at the technician level and who have also demonstrated sufficient command and leadership potential to warrant training and subsequent assignment at the hazardous materials branch officer level.

Methodology Recommendations

Hazardous materials branch officer training is best conducted with a combination of classroom instruction using traditional lecture and small-group activities, field exercises involving group practice in simulated emergencies, and hands-on skill training in doing and supervising actual control, confinement and containment exercises. There should be a strong emphasis on field training to include incident decision-making and real time practice coordinating and directing the incident scene operations of the hazardous materials team. Content instruction should be synthesized in student activities requiring analysis of incident information to determine plans of action and requiring supervisory assessment of the performance of hazardous materials team members during operations to determine needed interventions and directions from the branch chief. Skill training and practice supervising subordinate skill evolutions should be performed on actual containers with simulated releases, using full protective equipment and proper response tools. Skill training and branch chief field supervision instruction should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential.

Refresher training should include (1) competency retesting of all response skills, (2) technical information updates, and (3) critique of incident scene decision-making and hazardous materials team leadership behaviors using simulated emergencies.

SUMMARY: Hazardous Materials Branch Officer

Audience	Prerequisites	Training	Refresher
Small in number. Members of hazmat teams at the technician level who have branch command and leadership potential.	Prior training and demonstrated competency at the awareness, operational, and technician levels.	- No specific length of training is recommended or commonly in use. Length of training should be sufficient to achieve competency. - Classroom, lab, and field exercise formats recommended. - Competencies include: Analyzing the incident; Planning the response; Implementing the response; Reporting and documenting the haz mat incident.	1. Retesting of resp skills. 2. Technical info updates. 3. Refreshing of incident scene decision-making and branch team leadership .

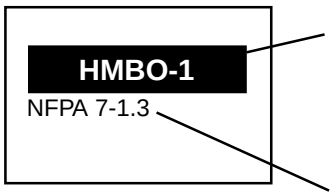
Recommended Training

For Hazardous Materials Branch Officer

The following training objectives are recommended for hazardous materials branch officer training. The primary source for this material is NFPA 472, Chapter 7: Competencies for the Hazardous Materials Branch Officer. Training objectives from other sources are noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

These objectives define competencies for a response function which is not directly specified by OSHA. However, the branch officer function is a natural derivative of the use of the incident command system and of the performance of the incident commander, including branch level delegation, both of which are required by OSHA. Because the function of hazardous materials branch officer is not directly specified in OSHA 29 CFR 1910.120, the following recommended training objectives are not individually cross-referenced to specific OSHA competency requirements. The general OSHA requirements which support this function are OSHA 29 CFR 1910.120 (q) (6) (v) for On Scene Incident Commander responsibilities including branch delegation and OSHA 29 CFR 1910.120 (q) (3) (i-ix) for the use of the Incident Command System during hazardous materials response.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as HMBO-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA 472, Chapter 7.

Identification	***Recommended** Training Objectives*
HMBO-1 NFPA 7-1.3	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the hazardous materials branch officer.
HMBO-1.1 NFPA 7-1.3(a)	Describe the responsibility to analyze a hazardous materials incident to determine the magnitude of the problem by estimating the potential outcomes within the endangered area.
HMBO-1.2 NFPA 7-1.3(b)	Describe the responsibility to plan a response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
HMBO-1.2.1 NFPA 7-1.3(b)1	Identify the response objectives for hazardous materials incidents.
HMBO-1.2.2 NFPA 7-1.3(b)2	Identify the potential action options (defensive, offensive, and nonintervention) available by response objective.
HMBO-1.2.3 NFPA 7-1.3(b)3	Identify the responsibility to determine the level of personal protective equipment required for a given action option.

HMBO-1.2.4 NFPA 7-1.3(b)4	Identify the responsibility to provide recommendations to the incident commander for the development of a plan of action for the hazardous materials branch consistent with the local emergency response plan and the organization's standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment.
HMBO-1.3 NFPA 7-1.3(c)	Describe the responsibility to implement a response to favorably change the outcomes consistent with the local emergency response plan and the organization's standard operating procedures.
HMBO-1.3.1 NFPA 7-1.3(c)1	Identify the responsibility to implement the incident management system as it directly relates to the specified procedures for hazardous materials branch operations.
HMBO-1.3.2 NFPA 7-1.3(c)2	Identify the responsibility to direct hazardous materials branch resources (private, governmental, and others) with expected task assignments and on-scene activities and provide management overviews, technical review, and logistical support to hazardous materials branch resources.
HMBO-1.4 NFPA 7-1.3(d)	Describe the responsibility to evaluate the progress of the planned response to ensure that the response objectives are being met safely, effectively, and efficiently and adjust the plan of action accordingly by evaluating the progress of the plan of action.
HMBO-1.5 NFPA 7-1.3(e)	Describe the responsibility to terminate the incident.
HMBO-1.5.1 NFPA 7-1.3(e)1	Identify the responsibility to conduct a debriefing for hazardous materials branch personnel.
HMBO-1.5.2 NFPA 7-1.3(e)2	Identify the responsibility to conduct a critique for hazardous materials branch personnel.
HMBO-1.5.3 NFPA 7-1.3(e)3	Identify the responsibility to report and document the hazardous materials branch operations.

Analyzing the Incident
Estimating Potential Outcomes

HMBO-2 NFPA 7-2.1	Given simulated facility or transportation incidents involving hazardous materials, the surrounding conditions, and the predicted behavior of the container and its contents, estimate the potential outcomes within the endangered area.

Planning the Response
Selecting the Level of Personal Protective Equipment

HMBO-3 NFPA 7-3.1	Given situations with known and unknown hazardous materials, select the appropriate personal protective equipment for the action options specified in the plan of action in each situation.

Planning the Response
Developing a Plan of Action

HMBO-4
NFPA 7-3.2

Given simulated facility and transportation hazardous materials incidents, develop a plan of action consistent with the local emergency response plan and the organization's standard operating procedures that is within the capability of the available personnel, personal protective equipment, and control equipment.

HMBO-4.1
NFPA 7-3.2.1

Identify the order of the steps for developing a plan of action.

HMBO-4.2
NFPA 7-3.2.2

Identify the factors to be evaluated in selecting public protective actions, including evacuation and shelter in-place.

HMBO-4.3
NFPA 7-3.2.3

Given the local emergency response plan or the organization's standard operating procedure, identify procedures to accomplish the following tasks:

(a) Make ongoing assessments of the situation
(b) Command on-scene personnel (incident management system) assigned to the hazardous materials branch
(c) Coordinate hazardous materials support and mutual aid
(d) Provide resources for public protection action (evacuation or shelter in-place)
(e) Coordinate with fire suppression services as it relates to hazardous materials incidents
(f) Coordinate hazardous materials branch control, containment, or confinement operations
(g) Coordinate with the medical branch to ensure proper medical assistance (ambulance) and medical treatment (hospital)
(h) Coordinate on-scene decontamination when appropriate
(i) Coordinate activities with those of the environmental remedial action ("cleanup") services

HMBO-4.4
NFPA 7-3.2.4

Identify the process for determining the effectiveness of an action option on the potential outcomes.

HMBO-4.5
NFPA 7-3.2.5

Identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials incident.

Implementing the Planned Response
Implementing the Incident Management System

HMBO-5
NFPA 7-4.1

Given a copy of the local emergency response plan, identify the requirements of the plan, including the required procedures for notification and utilization of nonlocal resources (private, state, and federal government personnel).

HMBO-5.1
NFPA 7-4.1.1

Identify the process and procedures for obtaining cleanup and restoration services in the local emergency response plan or organization's standard operating procedures.

HMBO-5.2
NFPA 7-4.1.2

Identify the steps for implementing the local and related emergency response plans as required under SARA Title III Section 303 of the federal regulations or other local emergency response planning legislation.

HMBO-5.3 NFPA 7-4.1.3	Given the local emergency planning documents, identify the elements of each of the documents.
HMBO-5.4 NFPA 7-4.1.4	Identify the elements of the incident management system necessary to coordinate response activities at hazardous materials incidents.
HMBO-5.5 NFPA 7-4.1.5	Identify the primary local, state, regional, and federal government agencies and identify the scope of their regulatory authority (including the regulations) pertaining to the production, transportation, storage, and use of hazardous materials and the disposal of hazardous wastes.
HMBO-5.6 NFPA 7-4.1.6	Identify the governmental agencies and private sector resources offering assistance to the hazardous materials branch during a hazardous materials incident and identify their role and type of assistance or resources available.

Implementing the Planned Response
Directing Resources (Private and Governmental)

HMBO-6 NFPA 7-4.2	Given a simulated hazardous materials incident and the necessary resources to implement the planned response, demonstrate the ability to direct the hazardous materials branch resources in a safe and efficient manner consistent with the capabilities of those resources.

Implementing the Planned Response
Providing a Focal Point for Information Transfer to Media and Elected Officials

HMBO-7 NFPA 7-4.3	Given a simulated hazardous materials incident, demonstrate the ability to act as a resource to provide information to the incident commander or the public information officer for distribution to the media and local, state, and federal officials.
HMBO-7.1 NFPA 7-4.3.1	Identify the local policy for providing information to the media.
HMBO-7.2 NFPA 7-4.3.2	Identify the responsibilities of the public information officer at a hazardous materials incident.

Evaluating Progress
Evaluating Progress of the Plan of Action

HMBO-8 NFPA 7-5.1	Given simulated facility and transportation hazardous materials incidents, evaluate the progress of the plan of action to determine whether the efforts are accomplishing the response objectives.
HMBO-8.1 NFPA 7-5.1.1	Identify the procedures for evaluating whether the action options are effective in accomplishing the objectives.
HMBO-8.2 NFPA 7-5.1.2	Identify the steps for comparing actual behavior of the material and the container to that predicted in the analysis process.

HMBO-8.3 NFPA 7-5.1.3	Determine the effectiveness of the following: (a)Hazardous materials response personnel being used (b)Personal protective equipment (c)Established control zones (d)Control, containment, or confinement operations (e)Decontamination process

Terminating the Incident
Terminating the Emergency Phase of the Hazardous Materials Incident

HMBO-9 NFPA 7-6.1	Given a simulated hazardous materials incident, demonstrate the ability to terminate the emergency phase of the incident consistent with the local emergency response plan and the organization's standard operating procedures.
HMBO-9.1 NFPA 7-6.1.1	Identify the steps required in terminating the emergency phase of a hazardous materials incident.
HMBO-9.2 NFPA 7-6.1.2	Identify the procedures for conducting incident debriefings at a hazardous materials incident.
HMBO-9.3 NFPA 7-6.1.3	Identify the steps in transferring authority as prescribed in the local emergency response plan or the organization's standard operating procedures.

Terminating the Incident
Conducting a Debriefing

HMBO-10 NFPA 7-6.2	Given the details of a simulated hazardous materials incident, demonstrate the ability to conduct a debriefing of the incident for all units assigned to the hazardous materials branch.
HMBO-10.1 NFPA 7-6.2.1	Describe three components of an effective debriefing.
HMBO-10.2 NFPA 7-6.2.2	Describe the key topics in an effective debriefing.
HMBO-10.3 NFPA 7-6.2.3	Describe when a debriefing should take place.
HMBO-10.4 NFPA 7-6.2.4	Describe who should be involved in a debriefing.
HMBO-10.5 NFPA 7-6.2.5	Identify the procedures for conducting incident debriefings at a hazardous materials incident.

Terminating the Incident
Conducting a Critique

HMBO-11 NFPA 7-6.3	Given the details of a simulated hazardous materials incident, demonstrate the ability to conduct a critique of the incident for all units assigned to the hazardous materials branch.
HMBO-11.1 NFPA 7-6.3.1	Describe three components of an effective critique.
HMBO-11.2 NFPA 7-6.3.2	Describe who should be involved in a critique.
HMBO-11.3 NFPA 7-6.3.3	Describe why an effective critique is necessary after a hazardous materials incident.
HMBO-11.4 NFPA 7-6.3.4	Describe what written documents should be prepared as a result of the critique.
HMBO-11.5 NFPA 7-6.3.5	Identify the procedure for conducting a critique of the incident.
HMBO-11.6 NFPA 7-6.3.6	Identify the requirements for conducting a post-incident analysis as defined in the local emergency response plan, the organization's standard operating procedures, or federal, state, and local regulations.

Terminating the Incident
Reporting and Documenting the Hazardous Materials Incident

HMBO-12 NFPA 7-6.4	Given a simulated hazardous materials incident, demonstrate the ability to report and document the incident consistent with the local, state, and federal requirements.
HMBO-12.1 NFPA 7-6.4.1	Identify the reporting requirements of federal, state, and local agencies.
HMBO-12.2 NFPA 7-6.4.2	Identify the importance of documentation for a hazardous materials incident, including training records, exposure records, incident reports, and critique reports.
HMBO-12.3 NFPA 7-6.4.3	Identify the steps in keeping an activity log and exposure records for hazardous materials incidents.
HMBO-12.4 NFPA 7-6.4.4	Identify the requirements found in the local emergency response plan and the organization's standard operating procedures for compiling hazardous materials incident reports.
HMBO-12.5 NFPA 7-6.4.5	Identify the requirements for filing documents and maintaining records as defined in the local emergency response plan and the organization's standard operating procedures.

Hazardous Materials

Incident Response Training Guidelines

Safety Officer at Hazardous Materials Incidents

General Training Considerations

Introduction

There are two training categories combined in this section. The first is the safety officer at hazardous materials incidents, as defined by OSHA and the second is the hazardous materials branch safety officer, as defined by NFPA.

The safety officer at hazardous materials incidents, as defined by OSHA, shall be trained to meet appropriate OSHA regulatory requirements to identify and evaluate hazards and provide direction to the safety of operations for emergency response sites.

The hazardous materials branch safety officer, as defined by NFPA, shall be trained to meet all competencies for the first responder at the awareness, operational, and technician levels and the competencies in this section. They also shall receive any additional training to meet applicable U.S. D.O.T., U.S.E.P.A., O.S.H.A. and other appropriate state, local or provincial occupational health and safety regulatory requirements.

Definition

The safety officer at hazardous materials incidents (OSHA) and the hazardous materials branch safety officer (NFPA) are those persons who work within an incident command system (also called an incident management system) to ensure that recognized safe practices are followed within the hazardous materials branch.

The safety officer at hazardous materials incidents (OSHA) has the authority to alter, suspend or terminate activities that involve dangerous conditions. The safety officer at hazardous materials incidents advises the incident commander of actions that need to take place in order to correct the hazards.

The hazardous materials branch safety officer (NFPA) will be called upon to provide technical advice or assistance regarding safety issues to the hazardous materials branch officer and incident safety officer at a hazardous materials incident.

Audience

The training audience for both the safety officer at hazardous materials incidents (OSHA) and the hazardous materials branch safety officer (NFPA) is relatively small in number and is technically advanced. The safety officer at hazardous materials incidents (OSHA) are persons with the potential to be qualified at the incident commander level with sufficient hazardous materials knowledge to identify risks and needed interventions. The training audience should include existing members of hazardous materials response teams who have experience and training at the technician level and who have also demonstrated sufficient potential to warrant training and subsequent assignment at the hazardous materials branch safety officer level.

Methodology Recommendations

The safety officer at hazardous materials incidents (OSHA) and the hazardous materials branch safety officer (NFPA) training is best conducted with a combination of classroom instruction using traditional lecture and small-group activities and field exercises involving group practice in simulated emergencies. There should be a strong emphasis on field training to include incident operations, safety evaluation and problem solving, to include real time practice identifying and implementing safety interventions during the incident scene operations of the hazardous materials team. Content instruction should be synthesized in student activities requiring analysis of incident information to determine safe plans of action and requiring assessment of the performance of hazardous materials team members during operations to determine needed safety interventions. Training should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential.

Refresher training should include (1) technical information updates, (2) critique of the ability to analyze an incident and assist in planning a safe response, and (3) critique of incident scene safety evaluation and intervention skills using simulated emergencies.

Federal Requirements

For Safety Officer at Hazardous Materials Incidents

There are no federally specified training requirements for hazardous materials branch safety officers, but OSHA 29 CFR 1910.120 (q) (3)(vii-viii) specifies certain performance and competency requirements for safety officer at hazardous materials incidents, and employers are required to ensure that employees demonstrate competency in the skills defined. Although the safety officer was initially defined in OSHA as advising the incident commander only, subsequent OSHA interpretations acknowledge that there may be multiple safety officers at the incident scene, advising to several levels of command.

OSHA 29 CFR 1910.120 (q) (3)(vii-viii)

(vii) The individual in charge of the ICS shall designate a safety officer, who is knowledgeable in the operations being implemented at the emergency response site, with specific responsibilities to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

(viii) When activities are judged by the safety officer to be an IDLH and/or to involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.

Required training can be translated directly into the following three sample objectives.

OSHA SO-A	Given a simulated incident involving hazardous materials, demonstrate the ability to identify and evaluate hazards at the incident and provide direction to development of a safe response plan.
OSHA SO-B	Given a simulated response to an incident involving hazardous materials, demonstrate the ability to identify and evaluate unsafe operations, activities and/or conditions involving imminent danger.
OSHA SO-C	Given identified unsafe conditions in a simulated response to an incident involving hazardous materials, demonstrate the ability to determine appropriate interventions, including altering, suspending or terminating selected response activities, and coordinating those interventions with the individual in charge of the ICS at the incident.

SUMMARY: Safety Officer at Hazardous Materials Incidents (OSHA) and Hazardous Materials Branch Safety Officer (NFPA)

Audience	Prerequisites	Training	Refresher
Small in number.		-No specific length of training is recommended or commonly in use. Length of training should be sufficient to allow students to achieve competency. -Classroom, lab, and field exercise formats recommended, with an emphasis on real time field simulations requiring practice in developing safe response plans and identifying safety problems during the implementation of the response plan. -Competencies: - Analyzing the incident. - Assisting in developing a safe response plan. - Assisting in implementing the response plan safely. - Evaluating the response for safety problems	1.Technical information updates. 2.Using simulated emergencies, refreshing of ability to analyze incident and develop safe response plans. 3.Using simulated emergencies, refreshing of ability to evaluate the response and identify safety problems and needed interventions.
Safety Officer (OSHA) Responders at the inc. comm. level with potential for assignment as incident safety officer .	Prior training and demonstrated competency at the awareness, operational, and inc. comm. levels.		
Branch Safety Officer (NFPA) Responders at the technician level with potential for assignment at the haz mat branch safety officer level.	Prior training and demonstrated competency at the awareness, operational, and technician levels.		

Recommended Training

For Hazardous Materials Branch Safety Officer

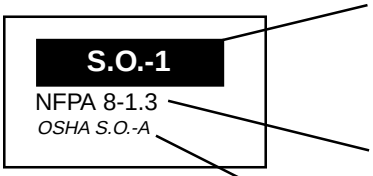
The following training objectives are recommended for hazardous materials branch safety officer training. The primary source for this material is NFPA 472, Chapter 8: Competencies for the Hazardous Materials Branch Safety Officer. Training objectives from other sources are noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

These objectives define competencies for a hazardous materials branch safety officer response function which is not directly specified by OSHA. However, OSHA 29 CFR 1910.120 (q) (3)(vii-viii) specifies certain performance and competency requirements for the safety officer at hazardous materials incidents, and employers are required to ensure that employees demonstrate competency in the skills defined. To assist in assessing course compliance with OSHA 1910.120 (q), the relationships between these hazardous materials branch safety officer objectives and OSHA requirements for the safety officer at the incident are noted. References to OSHA are abbreviated as noted.

Note that there is also a significant relationship between NFPA 472, Chapter 8: Competencies for the Hazardous Materials Branch Safety Officer and NFPA 1521, Competencies for Safety Officers. Most of the competencies listed below which are annotated to NFPA 472 may also be found in the special operations section of NFPA 1521.

The hazardous materials branch safety officer shall be trained to meet all competencies for the first responder at the awareness, operational, and technician levels and the competencies in this section. They also shall receive any additional training to meet applicable U.S. D.O.T., U.S.E.P.A., O.S.H.A. and other appropriate state, local or provincial occupational health and safety regulatory requirements.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as S.O. - 1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 29 CFR 1910.120 (q) (3) (vii-viii) = OSHA S.O. - A to C

Identification	***Recommended** Training Objectives*
S.O.-1 NFPA 8-1.3 *OSHA S.O.-A,B,C*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the hazardous materials branch safety officer.
S.O.-1.1 NFPA 8-1.3(a) *OSHA S.O.-B*	Describe the responsibility to analyze a hazardous materials incident to determine the magnitude of the problem in terms of safety by observing a scene and reviewing and evaluating hazard and response information as it pertains to the safety of all persons within the hazardous materials branch.
S.O.-1.2 NFPA 8-1.3(b) *OSHA S.O.-A*	Describe the responsibility to assist in planning a safe response within the capabilities of available response personnel, personal protective equipment, and control equipment.

S.O.-1.2.1 NFPA 8-1.3(b)1 *OSHA S.O.-A*	Identify the safety precautions for potential action options.
S.O.-1.2.2 NFPA 8-1.3(b)2 *OSHA S.O.-A*	Identify the responsibility to provide recommendations regarding safety considerations.
S.O.-1.2.3 NFPA 8-1.3(b)3 *OSHA S.O.-A*	Identify the responsibility to assist in the development of a plan of action.
S.O.-1.2.4 NFPA 8-1.3(b)4 *OSHA S.O.-A*	Identify the responsibility to review the plan of action and provide recommendations regarding safety.
S.O.-1.2.5 NFPA 8-1.3(b)5 *OSHA S.O.-A*	Identify the responsibility to review the selection of personal protective equipment required for a given action option.
S.O.-1.2.6 NFPA 8-1.3(b)6 *OSHA S.O.-A*	Identify the responsibility to review the decontamination operations.
S.O.-1.2.7 NFPA 8-1.3(b)7 *OSHA S.O.-A*	Identify the responsibility to ensure that the proper emergency medical services are provided.
S.O.-1.3 NFPA 8-1.3(c) *OSHA S.O.-A,B*	Describe the responsibility to ensure the implementation of a safe planned response consistent with the local emergency response plan, the organization's standard operating procedures, and safety considerations.
S.O.-1.3.1 NFPA 8-1.3(c)1 *OSHA S.O.-A,B,C*	Identify the responsibility to perform the duties of the hazardous materials branch safety officer within the local incident management system (IMS).
S.O.-1.3.2 NFPA 8-1.3(c)2 *OSHA S.O.-A*	Identify safety considerations for personnel performing the control functions identified in the plan of action.
S.O.-1.3.3 NFPA 8-1.3(c)3 *OSHA S.O.-A,B,C*	Identify the responsibility to conduct safety briefings for personnel performing the control functions identified in the plan of action.
S.O.-1.3.4 NFPA 8-1.3(c)4 *OSHA S.O.-A,B*	Identify the responsibility to assist in the implementation and enforcement of safety considerations.
S.O.-1.3.5 NFPA 8-1.3(c)5 *OSHA S.O.-A,C*	Identify the responsibility to maintain communications within the incident command structure during the incident.
S.O.-1.3.6 NFPA 8-1.3(c)6 *OSHA S.O.-A,B*	Identify the responsibility to monitor status reports of activities in the hot and warm zones.

S.O.-1.3.7
NFPA 8-1.3(c)7
OSHA S.O.-A,B

Identify the responsibility to ensure the implementation of exposure monitoring (personnel and environment).

S.O.-1.4
NFPA 8-1.3(d)
OSHA S.O.-A,B

Describe the responsibility to evaluate the progress of the planned response to ensure that the response objectives are being met safely.

S.O.-1.4.1
NFPA 8-1.3(d)1
OSHA S.O.-B

Identify deviations from safety considerations and any dangerous situations.

S.O.-1.4.2
NFPA 8-1.3(d)2
OSHA S.O.-B,C

Identify the responsibility to alter, suspend, or terminate any activity that can be judged to be unsafe.

S.O.-1.5
NFPA 8-1.3(e)
OSHA S.O.-A

Describe the responsibility to assist in terminating the incident.

S.O.-1.5.1
NFPA 8-1.3(e)1
OSHA S.O.-A,C

Identify the responsibility to perform the reporting, documentation and follow-up required of the hazardous materials branch safety officer.

S.O.-1.5.2
NFPA 8-1.3(e)2
OSHA S.O.-A,B

Identify the responsibility to assist in the debriefing of hazardous materials branch personnel.

S.O.-1.5.3
NFPA 8-1.3(e)3
OSHA S.O.-A,B

Identify the responsibility to assist in the incident critique.

Analyzing the Incident
Determining the Magnitude of the Problem in Terms of Safety

S.O.-2
NFPA 8-2.1
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, observe a scene and review and evaluate hazard and response information as it pertains to the safety of all persons within the hazardous materials branch.

S.O.-2.1
NFPA 8-2.1.1
OSHA S.O.-A

Describe the following radioactive materials terms and explain their significance in predicting the extent of health hazards and environmental impact in a hazardous materials incident:

(a)Types
(b)Measurement
(c)Protection

S.O.-2.2
NFPA 8-2.1.2
OSHA S.O.-A

Describe the following toxicological terms and exposure values and explain their significance in the risk assessment process:
(a)Parts per million (ppm)
(b)Parts per billion (ppb)
(c)Lethal dose (LD_{50})
(d)Lethal concentrations (LC_{50})
(e)Permissible exposure limit (PEL)
(f)Threshold limit value time-weighted average (TLV-TWA)
(g)Threshold limit value short-term exposure limit (TLV-STEL)
(h)Threshold limit value ceiling (TLV-C)
(i)Immediately dangerous to life and health value (IDLH)

S.O.-2.3
NFPA 8-2.1.3
OSHA S.O.-A

Explain the basic toxicological principles relative to assessment and treatment of personnel exposed to hazardous materials, including the following:
(a)Acute and delayed toxicity
(b)Dose-response
(c)Local and systemic effects
(d)Routes of exposure to toxic materials
(e)Synergistic effects

S.O.-2.4
NFPA 8-2.1.4
OSHA S.O.-A

Identify five conditions where the hazards from flammability would require chemical-protective clothing with thermal protection.

S.O.-2.5
NFPA 8-2.1.5
OSHA S.O.-A

Identify five conditions where personnel would not be allowed to enter the hot zone.

S.O.-2.6
NFPA 8-2.1.6
OSHA S.O.-A

Given the names of five hazardous materials and at least three reference sources, identify the physical and chemical properties and their potential impact on the safety of personnel at an incident involving each of the materials.

S.O.-2.7
NFPA 8-2.1.7
OSHA S.O.-A

Given the names of five hazardous materials and at least three reference sources, identify the health concerns and their potential impact on the safety and health of personnel at an incident involving each of the materials.

S.O.-2.8
NFPA 8-2.1.8
OSHA S.O.-A

Given the names of five hazardous materials and a description of their containers, identify five hazards or physical conditions that would impact the safety of personnel at an incident involving each of the materials.

S.O.-2.9
NFPA 8-2.1.9
OSHA S.O.-A

Given at least three unknown materials, one of which is a solid, one a liquid, and one a gas, identify or classify by hazard each unknown material.

S.O.-2.9.1
NFPA 8-2.1.9.1
OSHA S.O.-A

Identify steps in an analysis process for identifying unknown solid and liquid materials.

S.O.-2.9.2
NFPA 8-2.1.9.2
OSHA S.O.-A

Identify steps in an analysis process for identifying an unknown atmosphere.

S.O.-2.9.3
NFPA 8-2.1.9.3
OSHA S.O.-A

Identify the type(s) of monitoring equipment, test strips, and reagents used to determine the following hazards:
(a)Corrosivity (pH)
(b)Flammability
(c)Oxidation potential
(d)Oxygen deficiency
(e)Radioactivity
(f)Toxic levels

S.O.-2.9.4
NFPA 8-2.1.9.4
OSHA S.O.-A

Identify the capabilities and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)Passive dosimeter
(f)Photoionization detectors
(g)pH indicators and/or pH meters
(h)Radiation detection instruments
(i)Reagents
(j)Test strips

S.O.-2.9.5
NFPA 8-2.1.9.5
OSHA S.O.-A

Given three hazardous materials, one of which is a solid, one a liquid, and one a gas, and the following monitoring equipment, select and demonstrate the appropriate equipment to identify and quantify the materials:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)pH papers and/or pH meters
(f)Radiation detection instruments
(g)Reagents
(h)Test strips

S.O.-2.9.6
NFPA 8-2.1.9.6
OSHA S.O.-A

Demonstrate the field maintenance and testing procedures for the monitoring equipment, test strips and reagents provided by the authority having jurisdiction.

Planning the Response
Identifying the Safety Precautions for Potential Action Options

S.O.-3
NFPA 8-3.1
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, assist in planning a safe response within the capabilities of available response personnel, personal protective equipment, and control equipment.

S.O.-3.1
NFPA 8-3.1.1
OSHA S.O.-A

Identify five specific safety precautions to observe while mitigating each of the hazards or conditions identified in 8-2.1.8.

S.O.-3.2
NFPA 8-3.1.2
OSHA S.O.-A

Identify five safety precautions associated with search and rescue missions at hazardous materials incidents.

Planning the Response
Providing Recommendations Regarding Safety Considerations

S.O.-4
NFPA 8-3.2
OSHA S.O.-A,C

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, provide the incident safety officer, hazardous materials branch officer, and incident commander with observation-based recommendations regarding considerations for the safety of on-site personnel and be able to identify five recommendations to the incident commander regarding safety considerations on the hazards or conditions for each of the hazardous materials and containers identified in S.O.-2.8(NFPA 8-2.1.8).

Planning the Response
Assisting in the Development of a Plan of Action

S.O.-5
NFPA 8-3.3
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, assist the incident safety officer and hazardous materials branch officer in the development of a safe plan of action.

S.O.-5.1
NFPA 8-3.3.1
OSHA S.O.-A

Identify the importance and list five benefits of pre-emergency planning relating to specific sites.

S.O.-5.2
NFPA 8-3.3.2
OSHA S.O.-A

Identify and name five hazards and precautions to be observed when approaching a hazardous materials incident.

S.O.-5.3
NFPA 8-3.3.3
OSHA S.O.-A

List the elements of safety considerations.

S.O.-5.4
NFPA 8-3.3.4
OSHA S.O.-A

Given an organizations pre-incident plan and a simulated hazardous materials incident involving one of the hazardous materials and containers described in 8-2.1.8, develop safety considerations for the incident.

Planning the Response
Providing Recommendations Regarding Safety and Reviewing the Plan of Action

S.O.-6
NFPA 8-3.4
OSHA S.O.-A

Given a proposed plan of action for an incident involving one of the hazardous materials and containers described in 8-2.1.8, identify to the incident safety officer, hazardous materials branch officer, and incident commander the safety precautions for the plan of action.

S.O.-6.1
NFPA 8-3.4.1
OSHA S.O.-A

Ensure that the safety considerations in the proposed plan of action are consistent with the local emergency response plan and the organization's standard operating procedures.

S.O.-6.2
NFPA 8-3.4.2
OSHA S.O.-A

Make recommendations to the incident commander on the safety considerations in the proposed plan of action.

Planning the Response
Reviewing Selection of Personal Protective Equipment

S.O.-7
NFPA 8-3.5
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, demonstrate the ability to review the selection of personal protective equipment required for a given action option.

S.O.-7.1
NFPA 8-3.5.1
OSHA S.O.-A

Identify the four levels of chemical protection (EPA/NIOSH) and describe the equipment required for each level and the conditions under which each level is used.

S.O.-7.2
NFPA 8-3.5.2
OSHA S.O.-A

Identify five safety considerations for personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.

S.O.-7.3
NFPA 8-3.5.3
OSHA S.O.-A

Given the names of five different hazardous materials and a chemical compatibility chart for chemical-protective clothing, identify the chemical-protective clothing that would provide the appropriate protection to the wearer for each of the five substances.

S.O.-7.4
NFPA 8-3.5.4
OSHA S.O.-A

Given the names of five different hazardous materials, identify appropriate chemical-protective clothing levels for typical action options.

S.O.-7.5
NFPA 8-3.5.5
OSHA S.O.-A

Demonstrate proper methods for donning, doffing, and using all personal protective equipment provided by the authority having jurisdiction for use in hazardous materials response activities.

Planning the Response
Reviewing the Proposed Decontamination Plan

S.O.-8
NFPA 8-3.6
OSHA S.O.-A

Given a site-specific decontamination plan by the hazardous materials branch officer or incident commander for a simulated hazardous materials incident, review the plan to identify safety considerations prior to plan implementation.

S.O.-8.1
NFPA 8-3.6.1
OSHA S.O.-A

Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used:
(a)Absorption
(b)Adsorption
(c)Chemical degradation
(d)Dilution
(e)Disposal
(f)Evaporation
(g)Neutralization
(h)Solidification
(i)Vacuuming
(j)Washing

S.O.-8.2
NFPA 8-3.6.2
OSHA S.O.-A

Identify how personnel, personal protective equipment, apparatus, tools, and equipment become contaminated, as well as the importance and limitations of decontamination procedures.

S.O.-8.3
NFPA 8-3.6.3
OSHA S.O.-A

Explain the need for decontamination procedures at hazardous materials incidents.

S.O.-8.4
NFPA 8-3.6.4
OSHA S.O.-A

Identify three sources of technical information for selecting appropriate decontamination procedures and identify how to contact those sources in an emergency.

S.O.-8.5
NFPA 8-3.6.5
OSHA S.O.-A

Identify the considerations associated with the placement, location, and setup of the decontamination corridor.

S.O.-8.6
NFPA 8-3.6.6
OSHA S.O.-A

Identify the decontamination procedures as defined by the authority having jurisdiction for personnel and personal protective equipment at hazardous materials incidents.

S.O.-8.7
NFPA 8-3.6.7
OSHA S.O.-A

Given three reference sources and a simulated hazardous materials incident involving two or more different chemicals, develop a site-specific personnel decontamination plan that is consistent with the local emergency response plan and the organization's standard operating guidelines.

Planning the Response
Ensuring Provision of Proper Emergency Medical Services

S.O.-9
NFPA 8-3.7
OSHA S.O.-A

Given a simulated hazardous materials incident, review the emergency medical services plan to ensure that response personnel are provided medical care.

S.O.-9.1
NFPA 8-3.7.1
OSHA S.O.-A

Identify the elements required in an emergency medical services plan.

S.O.-9.2
NFPA 8-3.7.2
OSHA S.O.-A

Identify the importance of an on-site medical monitoring program.

S.O.-9.3
NFPA 8-3.7.3
OSHA S.O.-A

Identify three resources for the transportation and care of the injured persons exposed to hazardous materials.

Implementing the Planned Response
Performing the Duties of the Hazardous Materials Branch Safety Officer

S.O.-10
NFPA 8-4.1
OSHA S.O.-A,B,C

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, perform the duties of their position in a manner consistent with the local emergency response plan, the organization's standard operating procedures, and safety considerations.

S.O.-10.1
NFPA 8-4.1.1
OSHA S.O.-A,B,C

Identify the duties of the hazardous materials branch safety officer as defined in the organization's standard operating procedures.

S.O.-10.2
NFPA 8-4.1.2
OSHA S.O.-A,B,C

Demonstrate proper performance of the duties of the hazardous materials branch safety officer as defined in the organization's standard operating procedures.

Implementing the Planned Response
Monitoring Safety of Response Personnel

S.O.-11 NFPA 8-4.2 *OSHA S.O.-A,B*	Given a simulated hazardous materials incident and safety considerations, ensure that personnel perform their tasks in a safe manner by identifying the safety considerations for the control functions identified in the plan of action.
S.O.-11.1 NFPA 8-4.2.1 *OSHA S.O.-A,B*	Identify the safe operating practices that are required to be followed at a hazardous materials incident as stated in the local emergency response plan and the organization's standard operating procedures.
S.O.-11.2 NFPA 8-4.2.2 *OSHA S.O.-A,B*	Identify how the following factors influence heat and cold stress for hazardous materials response personnel: (a)Activity levels (b)Duration of entry (c)Environmental factors (d)Hydration (e)Level of PPE (f)Physical fitness
S.O.-11.3 NFPA 8-4.2.3 *OSHA S.O.-A,B*	Identify the methods that will minimize the potential harm from heat and cold stress.
S.O.-11.4 NFPA 8-4.2.4 *OSHA S.O.-A,B*	Identify the safety considerations that will minimize the psychological and physical stresses on personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.
S.O.-11.5 NFPA 8-4.2.5 *OSHA S.O.-A,B*	Describe five conditions where it would be prudent to withdraw from a hazardous materials incident.

Implementing the Planned Response
Conducting Safety Briefings

S.O.-12 NFPA 8-4.3 *OSHA S.O.-B,C*	Given a simulated hazardous materials incident and safety considerations, conduct safety briefings for personnel performing the control functions identified in the plan of action and demonstrate the proper procedure for conducting a safety briefing to personnel for an incident involving one of the hazardous materials and its container identified in S.O.-2.8(NFPA 8-2.1.8), as specified by the organization's standard operating procedures.

Implementing the Planned Response
Implementing and Enforcing Safety Considerations

S.O.-13 NFPA 8-4.4 *OSHA S.O.-B,C*	Given a simulated hazardous materials incident and safety considerations, assist the incident commander, the incident safety officer, and the hazardous materials branch officer in implementing and enforcing the safety considerations.
S.O.-13.1 NFPA 8-4.4.1 *OSHA S.O.-B,C*	Identify whether the boundaries of the established control zones are clearly marked, consistent with the safety considerations, and are being maintained.
S.O.-13.2 NFPA 8-4.4.2 *OSHA S.O.-B,C*	Identify whether the on-site medical monitoring that are required by the authority having jurisdiction is being performed.

S.O.-13.3	NFPA 8-4.4.3 *OSHA S.O.-B,C*	Given an entry team, a backup team, and a decontamination team wearing personal protective clothing and equipment, identify that each team is properly protected and prepared to safely perform its assigned tasks.
S.O.-13.3.1	NFPA 8-4.4.3.1 *OSHA S.O.-B,C*	Identify whether the selection of clothing and equipment is consistent with safety considerations.
S.O.-13.3.2	NFPA 8-4.4.3.2 *OSHA S.O.-B,C*	Identify whether each team has examined the clothing for barrier integrity and the equipment to ensure proper working order.
S.O.-13.3.3	NFPA 8-4.4.3.3 *OSHA S.O.-B,C*	Identify whether protective clothing and equipment have been donned in accordance with the organization's standard operating procedures and the manufacturer's recommendations.
S.O.-13.4	NFPA 8-4.4.4 *OSHA S.O.-B,C*	Identify whether each person entering the hot zone has a specific task assignment, understands the assignment, is properly trained to perform the assigned task(s), and is working with a designated partner at all times during the assignment.
S.O.-13.5	NFPA 8-4.4.5 *OSHA S.O.-B,C*	Identify whether a backup team with the appropriate level of personal protective equipment is prepared at all times for immediate entry into the hot zone during entry team operations.
S.O.-13.6	NFPA 8-4.4.6 *OSHA S.O.-B,C*	Identify whether the decontamination process specified in the safety considerations is in place before any entry into the hot zone.
S.O.-13.7	NFPA 8-4.4.7 *OSHA S.O.-B,C*	Identify that each person exiting the hot zone and each tool or piece of equipment is decontaminated in accordance with the safety considerations and the degree of hazardous materials exposure.
S.O.-13.8	NFPA 8-4.4.8 *OSHA S.O.-B,C*	Demonstrate the proper procedure for recording the names of the individuals exiting the hot zone, as specified in the local emergency response plan and the organization's standard operating procedures.
S.O.-13.9	NFPA 8-4.4.9 *OSHA S.O.-B,C*	Identify three safety considerations that can minimize secondary contamination.

Implementing the Planned Response
Maintaining Communications

S.O.-14	NFPA 8-4.5 *OSHA S.O.-B,C*	Given a simulated hazardous materials incident and the safety considerations, maintain routine and emergency communications within the incident command structure at all times during the incident.
S.O.-14.1	NFPA 8-4.5.1 *OSHA S.O.-B,C*	Identify three types of communications systems used at hazardous materials incident sites.
S.O.-14.2	NFPA 8-4.5.2 *OSHA S.O.-B,C*	Identify whether each person assigned to work in the hot zone understands the emergency alerting and response procedures specified in the safety considerations prior to entry into the hot zone.

Implementing the Planned Response
Monitoring Status Reports

S.O.-15
NFPA 8-4.6
OSHA S.O.-B,C

Given a simulated hazardous materials incident and the safety considerations, monitor routine and emergency communications within the incident command structure at all times during the incident and identify whether entry team members regularly communicate the status of their work assignment to the hazardous materials branch officer.

Implementing the Planned Response
Implementing Exposure Monitoring

S.O.-16
NFPA 8-4.7
OSHA S.O.-B,C

Given a simulated hazardous materials incident and the safety considerations, assist the incident commander, the incident safety officer, and the hazardous materials branch officer in implementing exposure monitoring.

S.O.-16.1
NFPA 8-4.8
OSHA S.O.-B,C

Identify that exposure monitoring (personnel and environment) as specified in the organization's standard operating procedures and safety considerations is performed.

Evaluating Progress
Identifying Deviations from Safety Considerations and Any Dangerous Situations

S.O.-17
NFPA 8-5.1
OSHA S.O.-B

Given simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, and given simulated deviations from the safety considerations for activities in both the hot and warm zones and simulated dangerous conditions, evaluate the progress of the planned response to ensure that the response objectives are being met safely.

S.O.-17.1
NFPA 8-5.1.1
OSHA S.O.-B

Identify those actions that deviate from the safety considerations or otherwise violate generally accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines.

S.O.-17.2
NFPA 8-1.3
OSHA S.O.-B

Identify dangerous conditions that develop or are identified during work in the hot or warm zones that threaten the safety or health of persons in those zones.

S.O.-17.3
NFPA 8-5.1.3
OSHA S.O.-B

Identify the signs and symptoms of psychological and physical stresses on personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.

Evaluating Progress
Taking Corrective Actions

S.O.-18
NFPA 8-5.2
OSHA S.O.-B

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, and given simulated deviations from the safety considerations for activities in both the hot and warm zones and simulated dangerous conditions, take such corrective actions as are necessary to ensure the safety and health of persons in the hot and warm zones.

S.O.-18.1
NFPA 8-5.2.1
OSHA S.O.-B

Send emergency communications to, and receive emergency communications from, the incident safety officer, entry team personnel, the hazardous materials branch officer, and others as appropriate regarding safe working practices and conditions.

S.O.-18.1.1 NFPA 8-5.2.1.1 *OSHA S.O.-B*	Given a hazardous situation or condition that has developed or been identified following initial hot zone entry, demonstrate the application of the emergency alerting procedures specified in the safety considerations to communicate the hazard and emergency response information to the affected personnel.
S.O.-18.1.2 NFPA 8-5.2.1.2 *OSHA S.O.-B*	Given a demonstrated emergency alert via hand signal by a member of the entry team operating within the hot zone, identify the meaning of that signal as specified in the safety considerations.
S.O.-18.2 NFPA 8-5.2.2 *OSHA S.O.-B*	Identify the procedures to alter, suspend, or terminate any activity that can be judged to be unsafe, as specified in the local emergency response plan and the organization's standard operating procedures.
S.O.-18.3 NFPA 8-5.2.3 *OSHA S.O.-B*	Demonstrate the procedure for notifying the appropriate individual of the unsafe action and for directing alternative safe actions, in accordance with the safety considerations and the organization's standard operating procedures.
S.O.-18.4 NFPA 8-5.2.4 *OSHA S.O.-B*	Demonstrate the procedure for suspending or terminating an action that could result in an imminent hazard condition, in accordance with the safety considerations and the organization's standard operating procedures.

Terminating the Incident
Providing Reports and Documentation

S.O.-19 NFPA 8-6.1 *OSHA S.O.-C*	Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, complete and submit the reports, documentation, and follow-up required of the hazardous materials branch safety officer.
S.O.-19.1 NFPA 8-6.1.1 *OSHA S.O.-C*	Identify the safety reports and supporting documentation required by the local emergency response plan and the organization's standard operating procedures.
S.O.-19.2 NFPA 8-6.1.2 *OSHA S.O.-C*	Demonstrate the proper completion of the safety reports required by the local emergency response plan and the organization's standard operating procedures.
S.O.-19.3 NFPA 8-6.1.3 *OSHA S.O.-C*	Describe the importance of personnel exposure records.

Terminating the Incident
Debriefing of Hazardous Materials Branch Personnel

S.O.-20 NFPA 8-6.2 *OSHA S.O.-C*	Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, debrief hazardous materials branch personnel regarding site-specific occupational safety and health issues.
S.O.-20.1 NFPA 8-6.2.1 *OSHA S.O.-C*	Identify five health and safety topics to be addressed in an incident debriefing.

S.O.-20.2
NFPA 8-6.2.2
OSHA S.O.-C

Demonstrate the proper procedure for debriefing hazardous materials branch personnel regarding site-specific occupational safety and health areas of concern, as specified in the safety considerations, local emergency response plan, and the organization's standard operating procedures.

Terminating the Incident
Assisting in the Incident Critique

S.O.-21
NFPA 8-6.3
OSHA S.O.-B,C

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, provide safety and health-related critical observations of the activities that were performed in the hot and warm zones during the incident.

S.O.-21.1
NFPA 8-6.4
OSHA S.O.-B,C

Given the safety considerations and hazardous materials branch safety officer's report for a simulated incident, demonstrate the proper procedure for verbally presenting the following in accordance with the local emergency response plan and the organization's standard operating procedures:

(a) Safety and health-related critical observations of the activities that were performed in the hot and warm zones during the incident
(b) Recorded violations of the safety considerations or generally accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines
(c) Injuries or deaths that occurred as a result of reasonably unforeseen dangerous conditions that developed during the incident
(d) Injuries or deaths that occurred as a result of violations of the safety considerations or generally accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines
(e) The proper course of action(s) that would likely have prevented the injuries or deaths that occurred as a result of the safety violations identified in (d)
(f) Deficiencies or weaknesses in the safety considerations, local emergency response plan, and organizational standard operating procedures that were noted during or following the incident

Hazardous Materials

Incident Response Training Guidelines

OSHA: Specialist and NFPA: Specialist Employee A, and Technician Specialties

General Training Considerations

Introduction

Hazardous materials specialist is a defined response competency in OSHA 29 CFR 1910.120 (q)(6)(iv) but is not a defined competency category in NFPA 472, 1997 edition. However, there is a relationship between the OSHA Specialist competency and the competencies in NFPA 472, 1997 edition, for Private Sector Specialist Employee A and for the Technician Specialties: Tank Car, Cargo Tank, and Intermodal Tank. For this reason, these competencies are grouped together in this section.

Hazardous materials specialists (OSHA) shall be trained to meet all the requirements for the first responder at the awareness level, the first responder at the operations level, and the technician level. In addition, specialists must meet those competencies identified in this section. They also shall meet the training requirements and be provided medical surveillance in accordance with requirements of OSHA, local occupational health and safety regulatory agencies, or the U.S. Environmental Protection Agency (EPA), as appropriate for their jurisdiction.

Definition

Specialists respond to hazardous materials operations and provide support to the incident commander and/or the technician. The duties of specialists, although paralleling those of technicians, require more specific knowledge of hazards common to their area of specialization. They may act as site liaisons with Federal, State, local, and other government authorities, or they may serve as hazardous materials team leader, operations officer or advisor to the incident commander. The specialist's responsibilities may include having to work within the hot zone, and may include performing incident command functions in certain types of incidents.

Audience

Specialists may be members of hazardous material response teams, individual consultants, certain site specialist employees, as defined in Title 29 of the Code of Federal Regulations (CFR), or representatives from organizations that provide technical support to the team. Specialists may be broadly titled as hazardous materials specialists (using OSHA 29 CFR 1910.120 nomenclature) or off-site specialists A (using NFPA 472 nomenclature). They may be called something less generic such as product, container, process, or transportation specialists (such as NFPA 472 Technician with a Tank Car Specialty), or they may have a title referring to a very specific function, such as counter-terrorism explosives specialist or ICBM nuclear warhead specialist.

Under the OSHA and EPA rule, hazardous materials specialists initially shall receive at least 24 hours of training equal to the technician level, training equal to the hazardous materials specialist level competencies for the areas of specialty, and annually thereafter receive refresher training of sufficient content and duration and/or demonstrate continued competency in their area of specialization to the level of their expected involvement.

Methodology Recommendations

Training for hazardous materials specialists is best conducted with a varied mix of classroom instruction using traditional lecture and small activity approaches, field exercises involving group practice in simulated emergencies, and hands-on skill training in doing actual control, confinement, and containment evolutions. Content instruction should be synthesized in student activities requiring analysis of incident information to determine plans of action.

Skill training should be performed on actual containers with simulated releases, using full protective equipment and proper response tools. Skill training should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential. For hazardous materials specialists who may be required to command the incident response, field exercises or large group incident scene simulations are optimal for overall command structure practice, to develop effective incident management skills.

Refresher training should focus on practice in the warm and hot zones of a simulated emergency and should include (1) competency retesting of all response skills; (2) technical information updates; (3) critique of operational decision-making using simulated emergencies; and (4) critique of ICS performance and communication skills using simulated emergencies.

Federal Requirements

For Hazardous Materials Specialist Training

OSHA establishes the following training requirements for hazardous materials specialists. Length of training and method of testing are not specified, but hazardous materials specialists must have received training at the awareness, operations, and technician levels as well as at the specialist level. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(iv)
HAZARDOUS MATERIALS SPECIALIST

(iv) Hazardous materials specialist. Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local and other government authorities in regards to site activities. Hazardous materials specialists shall have competency in the following areas and the employer shall so certify:

- *(A) Know how to implement the local emergency response plan*
- *(B) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment*
- *(C) Know the state emergency response plan*
- *(D) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist*
- *(E) Understand in-depth hazard and risk assessment techniques*
- *(F) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available*
- *(G) Be able to determine and implement decontamination procedures.*
- *(H) Have the ability to develop a site safety and control plan*
- *(I) Understand chemical, radiological and toxicological terminology and behavior*

For hazardous materials specialists, required training can be translated directly into the following sample objectives:

Identification	*Sample **Required** Training Objectives*
OSHA HMSPEC-A	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, describe the steps to implement the local emergency response plan.
OSHA HMSPEC-B	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate an understanding of the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.
OSHA HMSPEC-C	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, describe the State emergency response plan.
OSHA HMSPEC-D	Given a simulated incident involving hazardous materials, select and demonstrate use of proper specialized chemical personal protective equipment.

Required Training

OSHA HMSPEC-E	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate an understanding of in-depth hazard and risk assessment techniques, and demonstrate providing technical advice or assistance regarding the hazards of the substance present and potential magnitude of the incident.
OSHA HMSPEC-F	Given a simulated incident involving hazardous materials, containers, and releases within the specialist's area of expertise, demonstrate specialized control, containment, and/or confinement operations.
OSHA HMSPEC-G	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate the ability to determine and implement decontamination procedures.
OSHA HMSPEC-H	Demonstrate the ability to develop a site safety and control plan.
OSHA HMSPEC-I	Define chemical, radiological and toxicological terms and describe chemical, radiological and toxicological materials behavior.

SUMMARY: Hazardous Materials Specialist

OSHA minimum requirement= 24 hours Technician training + Specialist training

Audience	Prerequisites	Training	Refresher
Very narrow. Prospective hazardous materials team leaders or personnel who are designated in response plans as the definitive response resource for specific products or types of hazardous materials emergencies.	1.1st Responder Awareness Training 2. 1st Responder Operations Training 3. Hazardous Materials Technician Training 4 Advanced technical expertise in specific area(s) of hazardous materials.	- Classroom and simulator/field instruction, with emphasis on hands-on training - Competencies: - Knowledge of role of specialist within incident command system and responsibilities within employer's emergency response plan and the State emergency response plan. - Knowledge of hazardous materials terminology and behavior, and ability to perform in depth hazard and risk assessment - Ability to perform specialized control, containment and/or confinement techniques - Ability to select and use specialized personal protective equipment - Ability to implement decontamination procedures. - Ability to develop a site safety and control plan.	1. Competency retesting of all response skills 2. Technical information updates. 3. Incident scene decision-making using simulated emergencies.

Recommended Training

For Hazardous Materials Specialist

The following training objectives are recommended for Hazardous Materials Specialist training. The sources for this material are:
1) NFPA 472, Chapter 6: Competencies for Private Sector Specialist Employees, Section 6.4: Private Sector Specialist Employee A;
2) NFPA 472, Chapter 9: Competencies for the Technician with a Tank Car Specialty;
3) NFPA 472, Chapter 10: Competencies for the Technician with a Cargo Tank Specialty; and
4) NFPA 472, Chapter 11: Competencies for the Technician with an Intermodal Tank Specialty.

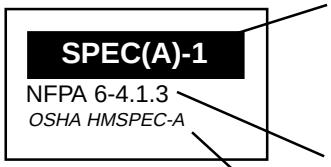
In order to retain the integrity of the NFPA 472 citations, the following identifications are used for the recommended objectives:

Objective ID	*Source*
SPEC(A)	Private Sector Specialist Employee A
TANK	Technician with a Tank Car Specialty
CARGO	Technician with a Cargo Tank Specialty
INTML	Technician with an Intermodal Tank Specialty

Hazardous materials specialist is a defined response competency in OSHA 29 CFR 1910.120 (q)(6)(iv) but is not a defined competency category in NFPA 472, 1997 edition. However, there is a relationship between the OSHA Specialist competency and the competencies in NFPA 472, 1997 edition, for Private Sector Specialist Employee A and for the Technician Specialties: Tank Car, Cargo Tank, and Intermodal Tank. To assist in assessing course compliance with OSHA 1910.120, the relationships between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.

In general, these recommended objectives do not constitute an increased level of training from that minimally required by OSHA for Haz Mat Specialist. Rather, these recommended objectives provide greater depth of definition of student competency for specific hazards, containers, and/or specific responder roles. To assist in assessing course compliance with OSHA 1910.120(q)(6)(iv), the relationships between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as SPEC(A)-1.1) indicate enabling objectives that support the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA 29 CFR 1910.120 (q) (6) (iv) are abbreviated as OSHA HMSPEC A to I.

Private Sector Specialist Employee A
(Reference: NFPA 472, Chapter 6)

Those persons who are specifically trained to handle incidents involving chemicals or containers for chemicals used in their organization's area of specialization. Consistent with the organization's emergency response plan and standard operating procedures, the private sector specialist employee A shall be able to analyze an incident involving chemicals within their organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

In addition to being competent at the private sector specialist employee C level and the hazardous materials technician level, the private sector specialist employee A shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
SPEC(A)-1 NFPA 6-4.1.3 *OSHA HMSPEC-A to I*	Given a hazardous materials incident scenario, define the role and responsibilities of private sector specialist employee A.
SPEC(A)-2 NFPA 6-4.1.3(a) *OSHA HMSPEC-B,E,I*	Given a simulated incident involving hazardous materials within the individual area of specialization, analyze an incident involving chemicals and containers for chemicals used in their organization's area of specialization to determine the magnitude of the incident.
SPEC(A)-2.1 NFPA 6-4.1.3(a)1 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to survey an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization to: (a)Identify the containers involved (b)Identify or classify unknown materials (c)Verify the identity of the chemicals
SPEC(A)-2.2 NFPA 6-4.1.3(a)2 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment for chemicals used in his or her organization's area of specialization.
SPEC(A)-2.3 NFPA 6-4.1.3(a)3 *OSHA HMSPEC-E*	Demonstrate the ability to determine the extent of damage to containers of chemicals used in his or her organization's area of specialization.
SPEC(A)-2.4 NFPA 6-4.1.3(a)4 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to predict the likely behavior of the chemicals and containers for chemicals used in his or her organization's area of specialization.
SPEC(A)-2.5 NFPA 6-4.1.3(a)5 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to estimate the potential outcomes of an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.
SPEC(A)-3 NFPA 6-4.1.3(b) *OSHA HMSPEC-A,F,H*	Given a simulated incident involving hazardous materials within the individual area of specialization, plan a response (within the capabilities of available resources) to an incident involving chemicals and containers for chemicals used in their organization's area of specialization.
SPEC(A)-3.1 NFPA 6-4.1.3(b)1 *OSHA HMSPEC-A,F,H*	Demonstrate the ability to identify the response objectives for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.2
NFPA 6-4.1.3(b)2
OSHA HMSPEC-A,F,H

Demonstrate the ability to identify the potential action options for each response objective for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.3
NFPA 6-4.1.3(b)3
OSHA HMSPEC-D

Demonstrate the ability to select the personal protective equipment required for a given response option for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.4
NFPA 6-4.1.3(b)4
OSHA HMSPEC-G

Demonstrate the ability to select the appropriate decontamination procedures, as necessary, for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.5
NFPA 6-4.1.3(b)5
OSHA HMSPEC-A,F,H

Demonstrate the ability to develop a plan of action (within the capabilities of the available resources), including safety considerations, for handling an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-4
NFPA 6-4.1.3(c)
OSHA HMSPEC-F

Given a simulated incident involving hazardous materials within the individual area of specialization, implement the planned response (as developed with the incident commander) to an incident involving chemicals and containers for chemicals used in their organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-4.1
NFPA 6-4.1.3(c)1
OSHA HMSPEC-D

Demonstrate the ability to don, work in, and doff appropriate personal protective equipment provided by their organization for use with chemicals used in their organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-4.2
NFPA 6-4.1.3(c)2
OSHA HMSPEC-F

Demonstrate the ability to perform control functions, as agreed upon with the incident commander, for chemicals and containers for chemicals used in their organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-5
NFPA 6-4.1.3(d)
OSHA HMSPEC-A,F,H

Given a simulated incident involving hazardous materials within the individual area of specialization, to evaluate the results of implementing the planned response to an incident involving chemicals and containers for chemicals used in their organization's area of specialization.

Technician with a Tank Car Specialty
(Reference: NFPA 472, Chapter 9)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged tank cars, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

Note that NFPA 472, Chapter 9, is **not** intended as a mandate that hazardous materials response teams must include technicians with a tank car specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 4, are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of tank cars.

In addition to being competent at the hazardous materials technician level, the technician with a tank car specialty shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
TANK-1 NFPA 9-1.3 *OSHA HMSPEC-A-I*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of technician with a tank car specialty.
TANK-1.1 NFPA 9-1.3(a) *OSHA HMSPEC-E*	Describe the responsibility to analyze a hazardous materials incident involving tank cars to determine the magnitude of the problem in terms of outcomes.
TANK-1.1.1 NFPA 9-1.3(a)1 *OSHA HMSPEC-E*	Identify the responsibility to determine the type and extent of damage to tank cars.
TANK-1.1.2 NFPA 9-1.3(a)2 *OSHA HMSPEC-E*	Identify the responsibility to predict the likely behavior of tank cars and their contents in an emergency.
TANK-1.2 NFPA 9-1.3(b) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to plan a response for an emergency involving tank cars within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
TANK-1.2.1 NFPA 9-1.3(b)1 *OSHA HMSPEC-A,C,D,E,F*	Identify the responsibility to determine the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving tank cars.
TANK-1.2.2 NFPA 9-1.3(b)2 *OSHA HMSPEC-A,C,D,E,F*	Identify the responsibility to ensure that the options are within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
TANK-1.3 NFPA 9-1.3(c) *OSHA HMSPEC-F*	Describe the responsibility to implement the planned response to a hazardous materials incident involving tank cars.

Analyzing the Incident
Determining the Type and Extent of Damage to Tank Cars

TANK-2
NFPA 9-2.1
OSHA HMSPEC-B,E

Given examples of damaged tank cars, describe the type and extent of damage to each tank car and its fittings.

TANK-2.1
NFPA 9-2.1.1
OSHA HMSPEC-B,E

Given the specification mark for a tank car and the appropriate reference materials, describe the car's basic construction and features.

TANK-2.2
NFPA 9-2.1.2
OSHA HMSPEC-B,E

Point out the "B" end of the car.

TANK-2.3
NFPA 9-2.1.3
OSHA HMSPEC-B,E

Given examples of various tank cars, point out and explain the design and purpose of each of the following tank car components, when present.
(a)Tank, including shell, and head
(b)Head shield
(c)Jacket
(d)Lining/cladding
(e)Heater coils – interior vs. exterior
(f)Underframe – continuous vs. stub sill
(g)Shelf couplers
(h)Body bolster
(i)Trucks (pin and bowl)

TANK-2.4
NFPA 9-2.1.4
OSHA HMSPEC-B,E

Given examples of tank cars (some jacketed; some not jacketed), point out the jacketed tank cars.

TANK-2.5
NFPA 9-2.1.5
OSHA HMSPEC-B,E

Describe the difference between "insulation" and "thermal protection" on tank cars.

TANK-2.6
NFPA 9-2.1.6
OSHA HMSPEC-B,E

Describe the difference between "jacketed" and "sprayed-on" thermal protection on tank cars.

TANK-2.7
NFPA 9-2.1.7
OSHA HMSPEC-B,E

Describe the difference between "interior" and "exterior" heater coils on tank cars.

TANK-2.8

NFPA 9-2.1.8
OSHA HMSPEC-B,E

Given examples of various fittings arrangements for pressure, nonpressure, cryogenic, and CO_2 tank cars (including examples of each of the following fittings), point out and explain the design, construction, and operation of each of the following fittings, when present:

(a)Fittings for loading and unloading tank cars, including the following:
1. Bottom outlet valves (top operated with stuffing box, bottom operated — internal or external ball, wafersphere)
2. Liquid valve/vapor valve (ball vs. plug type)
3. Excess flow valve
4. Air valve
5. Bottom outlet nozzle
6. Quick fill hole cover
7. Flange for manway, valves, etc.
8. CO_2 tank car fittings
9. Cryogenic liquid tank car fittings

(b)Fittings for pressure relief, including the following:
1. Safety relief devices (safety valve, safety vent, combination safety valve)
2. Pressure regulators on CO_2 cars and liquefied atmospheric gases in cryogenic liquid tank cars
3. Staged safety relief system for a CO_2 car
4. Vacuum relief valve (negative pressure or vacuum)

(c)Fittings for gauging, including the following:
1. Open gauging devices, e.g., slip tube
2. Closed gauging devices, e.g., magnetic
3. Other gauging devices (T-bar, long/short pole)

(d)Miscellaneous fittings, including the following:
1. Thermometer well
2. Sample line
3. Manway, manway cover plate, hinged and bolted manway cover, protective housing
4. Washout
5. Sump

TANK-2.9

NFPA 9-2.1.9
OSHA HMSPEC-B,E

Given examples of various fitting arrangements on tank cars (including CO_2 and cryogenic liquid tank cars) with the following fittings included, point out the location(s) where each fitting is likely to leak and a reason for the leak:

(a)Bottom outlet valve/top-operated bottom outlet valve (with stuffing box)
(b)Liquid valve/vapor valve (ball vs. plug type)
(c)Air valve
(d)Bottom outlet nozzle
(e)Quick fill hole cover
(f)Flange for manway, valves, etc.
(g)Safety relief valve
(h)Safety vent (with rupture/frangible) disk
(i)Combination safety valve
(j)Pressure regulators on CO_2 cars and liquefied atmospheric gases in cryogenic liquid tank cars
(k)Vacuum relief valve (negative pressure or vacuum)
(l)Open gauging devices, e.g., slip tube
(m)Closed gauging devices, e.g., magnetic
(n)Thermometer well
(o)Sample line
(p)Manway, manway cover plate, hinged and bolted manway cover, protective housing
(q)Washout

TANK-2.10
NFPA 9-2.1.10
OSHA HMSPEC-B,E

Given examples of each of the following types of tank car damage, identify the type of damage:
(a)Crack
(b)Score, gouge, wheel burn, rail burn
(c)Puncture
(d)Flame impingement
(e)Dent
(f)Corrosion

TANK-2.11
NFPA 9-2.1.11
OSHA HMSPEC-B,E

Given examples (actual or simulated) of scores, gouges, wheel burns, and rail burns, perform each of the following tasks:
(a)Use a depth gauge to measure the depth of each score, gouge, wheel burn, and rail burn
(b)Point out where each score, gouge, wheel burn, and rail burn crosses a weld, if that condition exists
(c)Measure the depth of the weld metal removed for any point where the score, gouge, wheel burn, and rail burn crosses a weld
(d)Given examples (actual or simulated) of where a score, gouge, wheel burn, and rail burn crosses a weld, determine if the "heat-affected zone" has been damaged

TANK-2.12
NFPA 9-2.1.12
OSHA HMSPEC-B,E

Given examples (actual or simulated) of dents and rail burns, perform each of the following tasks:
(a)Use a dent gauge to measure the radius of curvature for each dent or rail burn
(b)Identify those examples that include cracks at the point of minimum curvature

TANK-2.13
NFPA 9-2.1.13
OSHA HMSPEC-B,E

Given examples of damaged tank car fittings, describe the extent of damage to those fittings.

TANK-2.14
NFPA 9-2.1.14
OSHA HMSPEC-B,E

Given examples of tank car tank damage, describe the extent of damage to the tank car tank.

TANK-2.15
NFPA 9-2.1.15
OSHA HMSPEC-B,E

Given a tank car and the appropriate equipment and reference material, determine the pressure in the tank car, using either of the following methods:
(a)A pressure gauge
(b)The temperature of the contents

TANK-2.16
NFPA 9-2.1.16
OSHA HMSPEC-B,E

Given a tank car, use the car's gauging device to determine the amount of lading in it.

Analyzing the Incident
Predicting the Likely Behavior of the Tank Car and its Contents

TANK-3
NFPA 9-2.2
OSHA HMSPEC-B,E

Predict the likely behavior of the tank car and its contents.

TANK-3.1
NFPA 9-2.2.1
OSHA HMSPEC-B,E

Given the following types of tank cars, describe the likely breach/release mechanisms associated with each type.
(a)Nonpressure tank cars
(b)Pressure tank cars
(c)Cryogenic liquid tank cars
(d)High-pressure tube cars
(e)Pneumatically unloaded covered hopper cars

TANK-3.2
NFPA 9-2.2.2
OSHA HMSPEC-B,E

Describe the difference in the following types of construction materials used in tank cars and their significance in assessing tank damage:
(a)Carbon steel
(b)Alloy steel
(c)Aluminum

TANK-3.3
NFPA 9-2.2.3
OSHA HMSPEC-B,E

Discuss the significance of selection of lading for compatibility with tank car construction material.

TANK-3.4
NFPA 9-2.2.4
OSHA HMSPEC-B,E

Describe the significance of “lining” and “cladding” on tank cars in assessing tank damage.

TANK-3.5
NFPA 9-2.2.5
OSHA HMSPEC-B,E

Describe the significance of the jacket on tank cars in assessing tank damage.

TANK-3.6
NFPA 9-2.2.6
OSHA HMSPEC-B,E

Describe the significance of “insulation” and “thermal protection” on tank cars in assessing tank damage.

TANK-3.7
NFPA 9-2.2.7
OSHA HMSPEC-B,E

Describe the significance of “jacketed” and “sprayed-on” thermal protection on tank cars in assessing tank damage.

TANK-3.8
NFPA 9-2.2.8
OSHA HMSPEC-B,E

Describe the significance of “interior” and “exterior” heater coils on tank cars in assessing tank damage.

TANK-3.9
NFPA 9-2.2.9
OSHA HMSPEC-B,E

Describe the significance of each of the following types of tank car damage on different types of tank cars in assessing tank damage:
(a)Crack
(b)Score, gouge, wheel burn, rail burn
(c)Puncture
(d)Flame impingement
(e)Dent
(f)Corrosion

TANK-3.10
NFPA 9-2.2.10
OSHA HMSPEC-B,E

Describe the significance of the depth of scores, gouges, wheel burns, and rail burns on tank cars in assessing tank damage.

TANK-3.11
NFPA 9-2.2.11
OSHA HMSPEC-B,E

Describe the significance of scores, gouges, wheel burns, and rail burns crossing a weld on a pressure tank car in assessing tank damage.

TANK-3.12
NFPA 9-2.2.12
OSHA HMSPEC-B,E

Describe the significance of damage to the “heat affected” zone of a weld on a tank car in assessing tank damage.

TANK-3.13
NFPA 9-2.2.13
OSHA HMSPEC-B,E

Describe the significance of a condemning dent of a tank car in assessing tank damage.

TANK-3.14
NFPA 9-2.2.14
OSHA HMSPEC-B,E,I

Given various types of tank cars, describe the significance of pressure increases in assessing tank damage.

TANK-3.15
NFPA 9-2.2.15
OSHA HMSPEC-B,E,I

Given various types of tank cars, describe the significance of the amount of lading in the tank in assessing tank damage.

TANK-3.16
NFPA 9-2.2.16
OSHA HMSPEC-B,E,I

Describe the significance of flame impingement on a tank car.

Planning the Response
Determining the Response Options

TANK-4
NFPA 9-3.1
OSHA HMSPEC-F

Given the analysis of an emergency involving tank cars, determine the response options for each tank car involved.

TANK-4.1
NFPA 9-3.1.1
OSHA HMSPEC-D,F

Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for tank cars:
(a)Transferring liquids and vapors
(b)Flaring liquids and vapors
(c)Venting
(d)Hot and cold tapping
(e)Vent and burn

TANK-4.2
NFPA 9-3.1.2
OSHA HMSPEC-F

Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for leak control techniques on various tank car fittings.

TANK-4.3
NFPA 9-3.1.3
OSHA HMSPEC-F

Describe the effect flaring or venting gas or liquid has on the pressure in the tank (flammable gas or flammable liquid product).

TANK-4.4
NFPA 9-3.1.4
OSHA HMSPEC-F

Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for lifting of tank cars.

TANK-4.5
NFPA 9-3.1.5
OSHA HMSPEC-F

Describe the inherent risks associated with, procedures for, and safety precautions for the following operations:
(a)Shutting off locomotives using the fuel shutoff and the battery disconnect
(b)Setting and releasing brakes on rail cars
(c)Uncoupling rail cars

TANK-4.6
NFPA 9-3.1.6
OSHA HMSPEC-F

Describe the hazards associated with working on railroad property during emergencies.

Implementing the Planned Response

TANK-5
NFPA 9-4.1
OSHA HMSPEC-F

Given an analysis of an emergency involving tank cars and the planned response, implement or oversee the implementation of the selected response options safely and effectively.

TANK-5.1
NFPA 9-4.1.1
OSHA HMSPEC-F

Given a leaking manway cover plate (loose bolts), control the leak.

TANK-5.2
NFPA 9-4.1.2
OSHA HMSPEC-F

Given leaking packing on the following tank car fittings, control the leak:
(a)Gauging device packing nut
(b)Liquid or vapor valve packing nut
(c)Top-operated bottom outlet valve packing gland

TANK-5.3
NFPA 9-4.1.3
OSHA HMSPEC-F

Given an open bottom outlet valve with a defective gasket in the cap, control the leak.

TANK-5.4
NFPA 9-4.1.4
OSHA HMSPEC-F

Given a leaking top-operated bottom outlet valve, close valve completely to control leak.

TANK-5.5
NFPA 9-4.1.5
OSHA HMSPEC-F

Given leaking fittings on a chlorine tank car, use the Chlorine C kit, as appropriate, to control the leak.

TANK-5.6
NFPA 9-4.1.6
OSHA HMSPEC-F

Given the following types of leaks on various types of tank cars, plug or patch those leaks:
(a)Puncture
(b)Irregular-shaped hole
(c)Cracks, splits, or tears

TANK-5.7
NFPA 9-4.1.7
OSHA HMSPEC-F

Given the appropriate equipment and resources, demonstrate the following:
(a)Transferring of liquids and vapors
(b)Flaring of liquids and vapors
(c)Venting

TANK-5.8
NFPA 9-4.1.8
OSHA HMSPEC-F

Given the appropriate resources, perform the following tasks:
(a)Shut off locomotives using the fuel shutoff and the battery disconnect
(b)Set and release brakes on rail cars
(c)Uncouple rail cars

TANK-5.9
NFPA 9-4.1.9
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from tank cars, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
(a)Selection of proper equipment
(b)Sequence of bonding and grounding connections
(c)Proper testing of bonding and grounding connections

TANK-5.10
NFPA 9-4.1.10
OSHA HMSPEC-F

Given a simulated flammable liquid spill from a tank car, describe the procedures for site safety and fire control during cleanup and removal operations.

Technician with a Cargo Tank Specialty
(Reference: NFPA 472, Chapter 10)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged cargo tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

Note that NFPA 472, Chapter 10, is **not** intended as a mandate that hazardous materials response teams must include technicians with a cargo tank specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 4, are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of cargo tanks.

In addition to being competent at the hazardous materials technician level, the technician with a cargo tank specialty shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
CARGO-1 NFPA 10-1.3 *OSHA HMSPEC-A-I*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of Technician with a cargo tank specialty.
CARGO-1.1 NFPA 10-1.3(a) *OSHA HMSPEC-E*	Describe the responsibility to analyze a hazardous materials incident involving cargo tanks to determine the magnitude of the problem in terms of outcomes.
CARGO-1.1.1 NFPA 10-1.3(a)1 *OSHA HMSPEC-E*	Identify the responsibility to determine the type and extent of damage to cargo tanks.
CARGO-1.1.2 NFPA 10-1.3(a)2 *OSHA HMSPEC-E*	Identify the responsibility to predict the likely behavior of cargo tanks and their contents in an emergency.
CARGO-1.2 NFPA 10-1.3(b) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to plan a response for an emergency involving cargo tanks within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving cargo tanks.
CARGO-1.3 NFPA 10-1.3(c) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to implement the planned response to a hazardous materials incident involving cargo tanks.
	Analyzing the Incident ***Determining the Type and Extent of Damage to Cargo Tanks***
CARGO-2 NFPA 10-2.1 *OSHA HMSPEC-B,E*	Given examples of damaged cargo tanks, describe the type and extent of damage to each cargo tank and its fittings.
CARGO-2.1 NFPA 10-2.1.1 *OSHA HMSPEC-B,E*	Given the specification mark for a cargo tank and the appropriate reference materials, describe the tank's basic construction and features.

CARGO-2.2
NFPA 10-2.1.2
OSHA HMSPEC-B,E

Given examples of cargo tanks (some jacketed; some not jacketed), point out the jacketed cargo tanks.

CARGO-2.3
NFPA 10-2.1.3
OSHA HMSPEC-B,E

Given examples of the following types of cargo tank damage, identify the type of damage in each example:
(a)Crack
(b)Scrape, score, gouge, or loss of metal
(c)Puncture
(d)Dent
(e)Flame impingement
(f)Corrosion (internal/external)

CARGO-2.4
NFPA 10-2.1.4
OSHA HMSPEC-B,E

Given simulated damage to an MC-331 cargo tank, determine the extent of damage to the heat-affected zone.

CARGO-2.5
NFPA 10-2.1.5
OSHA HMSPEC-B,E

Given an MC-331 cargo tank containing a liquefied gas, determine the amount of liquid in the tank.

CARGO-2.6
NFPA 10-2.1.6
OSHA HMSPEC-B,E

Given an MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tank, point out and explain the design, construction, and operation of each of the following safety devices:
(a)Internal safety valve or external valve with accident protection, including method of activation (air, cable, hydraulic)
(b)Shear-type breakaway piping
(c)Emergency remote shutoff device
(d)Pressure and vacuum relief protection devices
(e)Dome cover design

CARGO-2.7
NFPA 10-2.1.7
OSHA HMSPEC-B,E

Given an MC-331 and MC-338 cargo tank, point out and explain the design, construction, and operation of each of the following safety devices:
(a)Internal safety valve or external valve with accident protection, including method of activation (air, cable, hydraulic)
(b)Excess flow valve
(c)Fusible link and nut assemblies
(d)Emergency remote shutoff device
(e)Pressure relief protection devices

CARGO-2.8
NFPA 10-2.1.8
OSHA HMSPEC-B,E

Given an MC-306/DOT-406 cargo tank, identify and describe the following normal methods of loading and unloading:
(a)Top loading
(b)Bottom loading
(c)Vapor recovery system

CARGO-2.9
NFPA 10-2.1.9
OSHA HMSPEC-B,E

Given the following types of cargo tank trucks and tube trailer, identify and describe the normal methods of loading and unloading:
(a)MC-307/DOT-407
(b)MC-312/DOT-412
(c)MC-331
(d)MC-338
(e)Compressed gas tube trailer

CARGO-2.10
NFPA 10-2.1.10
OSHA HMSPEC-B,E

Describe the normal and emergency methods of activation for the following types of cargo tank truck valve systems:
(a)Air
(b)Cable
(c)Hydraulic

CARGO-2..11
NFPA 10-2.1.11
OSHA HMSPEC-B,E

Given a cargo tank involved in an emergency, identify the factors to be evaluated as part of the cargo tank damage assessment process, including the following:
(a)Type of cargo tank (MC or DOT specification)
(b)Pressurized or nonpressurized
(c)Number of compartments
(d)Type of tank metal (e.g., aluminum vs. stainless steel)
(e)Nature of the emergency (e.g., rollover, vehicle accident, struck by object, etc.)
(f)Container stress applied to the cargo tank
(g)Type and nature of tank damage (e.g., puncture, dome cover leak, valve failure, etc.)
(h)Amount of product both released and remaining in the cargo tank

Analyzing the Incident
Predicting the Likely Behavior of the Cargo Tank and its Contents

CARGO-3
NFPA 10-2.2
OSHA HMSPEC-B,E

Predict the likely behavior of the cargo tank and its contents.

CARGO-3.1
NFPA 10-2.2.1
OSHA HMSPEC-B,E

Given the following types of cargo tanks (including a tube trailer), describe the likely breach/release mechanisms:
(a)MC-306/DOT-406 cargo tanks
(b)MC-307/DOT-407 cargo tanks
(c)MC-312/DOT-412 cargo tanks
(d)MC-331 cargo tanks
(e)MC-338 cargo tanks
(f)Compressed gas tube trailer

CARGO-3.2
NFPA 10-2.2.2
OSHA HMSPEC-B,E

Describe the difference in types of construction materials used in cargo tanks and their significance in assessing tank damage.

CARGO-3.3
NFPA 10-2.2.3
OSHA HMSPEC-B,E

Describe the significance of the jacket on cargo tanks in assessing tank damage.

CARGO-3.4
NFPA 10-2.2.4
OSHA HMSPEC-B,E

Describe the significance of each of the following types of damage on different types of cargo tanks in assessing tank damage:
(a)Crack
(b)Scrape, score, gouge, or loss of metal
(c)Puncture
(d)Dent
(e)Flame impingement
(f)Corrosion (internal/external)

CARGO-3.5
NFPA 10-2.2.5
OSHA HMSPEC-B,E

Given simulated damage to the heat-affected zone on a MC-331 cargo tank, describe the significance of the damage in assessing tank damage.

Planning the Response
Determining the Response Options

CARGO-4
NFPA 10-3.1
OSHA HMSPEC-F

Given the analysis of an emergency involving cargo tanks, determine the response options for each cargo tank involved.

CARGO-4.1
NFPA 10-3.1.1
OSHA HMSPEC-D,F

Given an incident involving a cargo tank, describe the methods, procedures, risks, safety precautions, and equipment that are required to implement spill and leak control procedures.

CARGO-4.2
NFPA 10-3.1.2
OSHA HMSPEC-F

Given an overturned cargo tank, describe the factors to be evaluated for uprighting, including the following:
(a)Type of cargo tank and material of construction
(b)Condition and weight of the cargo tank
(c)Type and nature of stress applied to the cargo tank
(d)Preferred lifting points
(e)Selection of lifting straps and/or air bags
(f)Lifting capabilities of wreckers and cranes
(g)Site safety precautions

Implementing the Planned Response

CARGO-5
NFPA 10-4.1
OSHA HMSPEC-F

Given an analysis of an emergency involving a cargo tank and the planned response, implement or oversee the implementation of the selected response options safely and effectively.

CARGO-5.1
NFPA 10-4.1.1
OSHA HMSPEC-F

Demonstrate the methods for containing the following leaks on liquid cargo tanks (e.g., MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412):
(a)Puncture
(b)Irregular-shaped hole
(c)Split or tear
(d)Dome cover leak
(e)Valves and piping
(f)Pressure relief devices (e.g., vents, burst disc, etc.)

CARGO-5.2
NFPA 10-4.1.2
OSHA HMSPEC-F

Describe the methods for containing the following leaks in MC-331 and MC-338 cargo tanks:
(a)Crack
(b)Failure of safety relief device (e.g., relief valve, burst disc, etc.)
(c)Piping failure

CARGO-5.3
NFPA 10-4.1.3
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from cargo tanks, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
(a)Selection of proper equipment
(b)Sequence of bonding and grounding connections
(c)Proper testing of bonding and grounding connections

CARGO-5.4
NFPA 10-4.1.4
OSHA HMSPEC-F

Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of each of the following:
(a)Portable pumps (air, electrical, gasoline/diesel)
(b)Vehicles with power-take-off (PTO) driven pumps
(c)Pressure transfer
(d)Vacuum trucks

CARGO-5.5
NFPA 10-4.1.5
OSHA HMSPEC-F

Given a simulated overturned MC-306/DOT-406 cargo tank, demonstrate the safe and proper procedures for the following methods of product removal and transfer:
(a)Drilling
(b)Unloading lines
(c)Vapor recovery lines
(d)Internal safety valve

CARGO-5.6
NFPA 10-4.1.6
OSHA HMSPEC-F

Given a simulated overturned MC-307/DOT-407 cargo tank, demonstrate the safe and proper procedures for product removal and transfer.

CARGO-5.7
NFPA 10-4.1.7
OSHA HMSPEC-F

Given a simulated overturned MC-331 cargo tank, demonstrate the safe and proper procedures for product removal and transfer.

CARGO-5.8
NFPA 10-4.1.8
OSHA HMSPEC-F

Given the necessary resources, demonstrate the flaring of a MC-331 flammable gas cargo tank.

CARGO-5.9
NFPA 10-4.1.9
OSHA HMSPEC-F

Given a simulated flammable liquid spill from a cargo tank, describe the procedures for site safety and fire control during cleanup and removal operations.

Technician with an Intermodal Tank Specialty

(Reference: NFPA 472, Chapter 11)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged intermodal tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

Note that NFPA 472, Chapter 11, is **not** intended as a mandate that hazardous materials response teams must include technicians with a intermodal tank specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 4, are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of intermodal tanks.

In addition to being competent at the hazardous materials technician level, the technician with an intermodal tank specialty shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
INTML-1 NFPA 11-1.3 *OSHA HMSPEC-A-I*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of technician with an intermodal tank specialty.
INTML-1.1 NFPA 11-1.3(a) *OSHA HMSPEC-E*	Describe the responsibility to analyze a hazardous materials incident involving an intermodal tank to determine the magnitude of the problem in terms of outcomes.
INTML-1.1.1 NFPA 11-1.3(a)1 *OSHA HMSPEC-E*	Identify the responsibility to determine the type and extent of damage to an intermodal tank.
INTML-1.1.2 NFPA 11-1.3(a)2 *OSHA HMSPEC-E*	Identify the responsibility to predict the likely behavior of an intermodal tank and its contents in an emergency.
INTML-1.2 NFPA 11-1.3(b) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to plan a response for an emergency involving an intermodal tank within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving intermodal tanks.
INTML-1.3 NFPA 11-1.3(c) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to implement the planned response to a hazardous materials incident involving intermodal tanks.
	Analyzing the Incident ***Determining the Type and Extent of Damage to Intermodal Tanks***
INTML-2 NFPA 11-2.1 *OSHA HMSPEC-B,E*	Given examples of damaged intermodal tanks, describe the type and extent of damage to each intermodal tank and its fittings.
INTML-2.1 NFPA 11-2.1.1 *OSHA HMSPEC-B,E*	Given the specification mark for an intermodal tank and the appropriate reference materials, describe the tank's basic construction and features.

INTML-2.2
NFPA 11-2.1.2
OSHA HMSPEC-B,E

Given examples of intermodal tanks (some jacketed; some not jacketed), point out the jacketed intermodal tanks.

INTML-2.3
NFPA 11-2.1.3
OSHA HMSPEC-B,E

Given examples of various intermodal tanks, point out and explain the design and purpose of each of the following intermodal tank components, when present:
(a)Supporting frame
(b)Corner casting
(c)Insulation
(d)Jacket
(e)Heater coils (steam/electric)
(f)Refrigeration unit
(g)Data plate

INTML-2.4
NFPA 11-2.1.4
OSHA HMSPEC-B,E

Given examples of various fittings arrangements for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following fittings, when present:
(a)Spill box
(b)Manhole cover
(c)Air line connection
(d)Top outlet
(e)Bottom outlet valve
(f)Thermometer
(g)Pressure gauge
(h)Gauging device
(i)Liquid or vapor valve
(j)Sample valve
(k)Thermometer well

INTML-2.5
NFPA 11-2.1.5
OSHA HMSPEC-B,E

Given examples of various safety devices for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following safety devices, when present:
(a)Safety relief valve
(b)Regulator valve
(c)Rupture disc
(d)Fusible link/nut assemblies
(e)Emergency remote shutoff device
(f)Excess flow valve

INTML-2.6
NFPA 11-2.1.6
OSHA HMSPEC-B,E

Given the following types of intermodal tank damage, identify the type of damage in each example and explain its significance.
(a)Crack
(b)Puncture
(c)Dent
(d)Flame impingement
(e)Corrosion (internal/external)
(f)Metal loss (gouge/score)

INTML-2.7
NFPA 11-2.1.7
OSHA HMSPEC-B,E

Given three examples of damage to the framework of intermodal tanks, describe the damage in each example and explain its significance in the risk analysis process.

INTML-2.8
NFPA 11-2.1.8
OSHA HMSPEC-B,E

Given an intermodal tank involved in an emergency, identify the factors to be evaluated as part of the intermodal tank damage assessment process, including the following:
(a)Type of intermodal tank
(b)Pressurized or nonpressurized
(c)Number of compartments
(d)Type of tank metal
(e)Nature of the emergency
(f)Container stress applied to the intermodal tank
(g)Type and nature of tank damage
(h)Amount of product both released and remaining in the intermodal tank

INTML-2.9
NFPA 11-2.1.9
OSHA HMSPEC-B,E

Given a pressure intermodal tank containing a liquefied gas, determine the amount of liquid in the tank.

INTML-2.10
NFPA 11-2.1.10
OSHA HMSPEC-B,E

Given simulated damage to a pressure intermodal tank, determine the extent of damage to the heat-affected zone.

Analyzing the Incident
Predicting the Likely Behavior of the Intermodal Tank and its Contents

INTML-3
NFPA 11-2.2
OSHA HMSPEC-B,E

Predict the likely behavior of the intermodal tank and its contents.

INTML-3.1
NFPA 11-2.2.1
OSHA HMSPEC-B,E

Given the following types of intermodal tanks, describe the likely breach/release mechanisms:
(a)IMO Type 1/IM-101
(b)IMO Type 2/IM-102
(c)IMO Type 5/DOT-51
(d)DOT-56
(e)DOT-57
(f)DOT-60
(g)Cryogenic (IMO Type 7)

INTML-3.2
NFPA 11-2.2.2
OSHA HMSPEC-B,E

Describe the difference in types of construction materials used in intermodal tanks relative to assessing tank damage.

Planning the Response
Determining the Response Options

INTML-4
NFPA 11-3.1
OSHA HMSPEC-F

Given the analysis of an emergency involving intermodal tanks, determine the response options for each intermodal tank involved.

INTML-4.1
NFPA 11-3.1.1
OSHA HMSPEC-F

Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for intermodal tanks:
(a)Transferring liquids and vapors (pressure/pump)
(b)Hot tapping
(c)Flaring liquids and vapors

INTML-4.2
NFPA 11-3.1.2
OSHA HMSPEC-F

Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on intermodal tanks, including equipment needed and safety precautions.

Implementing the Planned Response

INTML-5
NFPA 11-4.1
OSHA HMSPEC-F

Given an analysis of an emergency involving intermodal tanks and the planned response, implement or oversee the implementation of the selected response options safely and effectively.

INTML-5.1
NFPA 11-4.1.1
OSHA HMSPEC-F

Given leaks from the following fittings on intermodal tanks, control the leaks using proper methods and procedures.
(a)Manway cover
(b)Bottom outlet
(c)Liquid/vapor valve
(d)Safety relief device
(e)Tank

INTML-5.2
NFPA 11-4.1.2
OSHA HMSPEC-F

Demonstrate proper procedures for the following types of emergency product removal:
(a)Gas/liquid transfer (pressure/pump)
(b)Flaring
(c)Venting

INTML-5.3
NFPA 11-4.1.3
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from an intermodal tank, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
(a)Selection of proper equipment
(b)Sequence of bonding and grounding connections
(c)Proper testing of bonding and grounding connections

INTML-5.4
NFPA 11-4.1.4
OSHA HMSPEC-F

Demonstrate the methods for containing the following leaks on liquid intermodal tanks (e.g., IM-101 and IM-102):
(a)Puncture
(b)Irregular-shaped hole
(c)Split or tear
(d)Dome cover leak
(e)Valves and piping
(f)Pressure relief devices (e.g., vents, burst disc, etc.)

INTML-5.5
NFPA 11-4.1.5
OSHA HMSPEC-F

Describe the methods for containing the following leaks in pressure intermodal tanks:
(a)Crack
(b)Failure of safety relief device (e.g., relief valve, burst disc, etc.)
(c)Piping failure

INTML-5.6
NFPA 11-4.1.6
OSHA HMSPEC-F

Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of the following:
(a)Portable pumps (air, electrical, gasoline/diesel)
(b)Vehicles with power-take-off (PTO) driven pumps
(c)Pressure transfer
(d)Vacuum trucks

Recommended Training

INTML-5.7 NFPA 11-4.1.7 *OSHA HMSPEC-F*	Given a simulated overturned liquid intermodal tank, demonstrate the safe and proper procedures for product removal and transfer.
INTML-5.8 NFPA 11-4.1.8 *OSHA HMSPEC-F*	Given a simulated overturned pressure intermodal tank, demonstrate the safe and proper procedures for product removal and transfer.
INTML-5.9 NFPA 11-4.1.9 *OSHA HMSPEC-F*	Given the necessary resources, demonstrate the flaring of a pressure flammable gas intermodal tank.
INTML-5.10 NFPA 11-4.1.10 *OSHA HMSPEC-F*	Given a simulated flammable liquid spill from an intermodal tank, describe the procedures for site safety and fire control during cleanup and removal operations.

Hazardous Materials

Incident Response Training Guidelines

OSHA: Specialist Employee and NFPA: Specialist Employee B,C

General Training Considerations

Introduction

Specialist employees shall be trained to the first responder awareness level relative to their area of specialization and shall be trained to those additional competency levels identified in this section. Furthermore, specialist employees shall receive training to meet any applicable Federal (DOT, OSHA, EPA) or local occupational health and safety regulatory agency requirements.

Definition

Specialist employees are defined by OSHA 1910.120(q)(5) as persons who, in the course of their regular job duties, work with and are trained in the handling of specific hazardous substances or chemical-carrying containers and are also prepared to provide advice or assistance within their area of expertise to an incident commander of the hazardous materials team at a hazardous materials incident. Advice and assistance may include gathering, recording, and analyzing information as well as guidance regarding hazards and response options. Assistance also may include working as a technical adviser in the warm and hot zones, if the specialist employee is qualified to do so safely. These specialist functions are addressed somewhat differently in the National Fire Protection Association Standard 472, as Private Sector Specialist Employee C and Private Sector Specialist Employee B.

Private Sector Specialist Employees C are persons having training or educationally acquired expertise in a product, a container, a chemical process, or some procedure of importance to the mitigation of a hazardous materials incident. Private Sector Specialist Employees C may be asked to gather, record, and analyze information. They may serve as consultants and technical advisers to the incident commander or the hazardous materials team, or they may arrange for the provision of such assistance as necessary and related to their area of expertise. They are not expected to work in either the hot or warm zones of an incident area.

Private Sector Specialist Employees B meet the competencies of Private Sector Specialist Employees C and in addition are qualified to assist the response in the warm and hot zones of an incident area and are qualified to provide information on personal protective equipment, decontamination methods, and response evaluation.

Audience

Persons training under this provision shall include those titled specialist employees under Title 29 of the Code of Federal Regulations and those titled Private Sector Specialist Employees C and Private Sector Specialist Employees B using NFPA 472 nomenclature. They may be individual consultants or representatives of organizations that provide technical assistance related to their area of specialization at hazardous materials operations. The knowledge these specialists possess may have been acquired through site-specific hazardous substance training programs; military; public service, or commercial facilities; or educational institutions.

Methodology Recommendations

Typically, specialist employees are responsible for maintaining current technical knowledge in their areas of expertise as part of their normal job responsibilities. Therefore, additional training should focus on applying their technical knowledge to emergency situations. Because specialist employees will have diverse job responsibilities and work schedules, much instruction should be in short, classroom modules or perhaps independent study, with an emphasis on analyzing simulated incidents using existing professional technical expertise and knowledge. For specialist employees who may work in the warm or hot zone, hands-on training to competency in using personal protective clothing is essential. To learn and practice advisory and assistance roles in the incident command system, it also is recommended that local response personnel and area hazardous materials teams work with specialist employees in periodic field exercises.

Specialist employees annually shall receive refresher training of sufficient content and duration or shall demonstrate continued competency in their area of specialization to the level of their expected involvement. Refresher training should focus on hazardous materials incident scenario analysis and practice working as a subordinate and adviser to the response command structure and hazardous materials teams in field exercises simulating emergencies. For specialist employees who will work in warm and hot zones, there should be annual retesting of response skills.

Federal Requirements

For Specialist Employee Training

OSHA establishes the following training requirements for specialist employees. Length of training and method of testing are not specified, but employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(5)
SPECIALIST EMPLOYEES

Employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge, shall receive training or demonstrate competency in the area of their specialization annually.

Required training for specialist employees can be translated directly into the following sample objectives:

Identification	*Sample **Required** Training Objectives*
OSHA SpEMP-1	Given a simulated incident involving hazardous materials within the specialist employee's area of technical expertise, provide technical advice or assistance within the incident command structure regarding assessing the hazards of the substance present and potential magnitude of the incident.
OSHA SpEMP-2	Given a simulated incident involving hazardous materials within the specialist employee's area of technical expertise, provide technical advice within the incident command structure regarding potential response options.
OSHA SpEMP-3	Given a simulated incident involving hazardous materials within the specialist employee's area of technical expertise, provide technical assistance under the incident command structure for control, confinement and containment operations and for incident termination and evaluation activities.

SUMMARY: Specialist Employee

Audience	Prerequisites	Training	Refresher
Very broad. Any persons with existing job expertise in the hazards of specific chemicals or containers, who may be called upon to provide assistance during a hazmat emergency.	1. First Responder Awareness training. 2. Advanced technical expertise in specific hazardous chemicals or containers.	-Classroom, and simulator/field instruction with emphasis on participation in incident response scenarios. Hands-on where appropriate. -Competencies: - Ability to perform in depth hazard and risk assessment within area of expertise. - Ability to recommend response plan options, protective equipment and decontamination requirements, and to assist evaluation. *Additional competencies for those specialist employees whose expertise and assistance may be required in the warm or hot zone:* - Ability to perform specialized control, containment and/or confinement techniques. - Ability to select and use specialized personal protective equipment.	1. Practice providing hazard analysis and response advice during simulated emergencies. *For those specialist employees who may provide assistance in the warm or hot zone:* 2. Competency retesting of response skills and use of personal protective equipment.

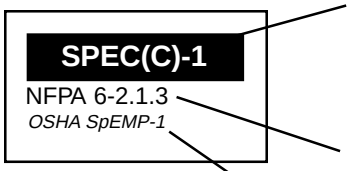
Recommended Training

For Specialist Employee

The following training objectives are recommended for specialist employees. The source for this material is NFPA 472, Chapter 6: Competencies for Private Sector Specialist Employees, section 6-2 (Private Sector Specialist Employee C) and section 6-3 (Private Sector Specialist Employee B). To retain the integrity of the NFPA 472 citations, the groupings of objectives B and C levels are retained. Recommended objectives for Private Sector Specialist Employee C are referred to as SPEC(C) and recommended objectives for Private Sector Specialist Employee B are referred to as SPEC(B).

In general, these recommended objectives are comparable in scope to those minimally required by OSHA. They do not constitute an increased level of training but rather provide greater depth of definition of trainee objectives. The goal of these competencies is to ensure that the specialist employees have the knowledge and skills to safely perform the duties and responsibilities assigned in their organization's emergency response plan and SOP's. To assist in assessing course compliance with OSHA 1910.120(q), the relationships between these objectives and the OSHA requirements are noted.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as SPEC(C)-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA 1910.120(q)(5) are abbreviated as OSHA SpEMP 1-3.

Private Sector Specialist Employee C

In addition to being at the first responder awareness level relative to his or her organization's area of specialization, the private sector specialist employee C shall also achieve the following training objectives:

Identification	***Recommended** Training Objectives*
SPEC(C)-1 NFPA 6-2.1.3 *OSHA SpEMP-1,2*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the Private Sector Specialist Employee C.
SPEC(C)-1.1 NFPA 6-2.1.3(a) *OSHA SpEMP-1*	Describe the responsibility to assist the incident commander in analyzing the magnitude of an emergency involving chemicals or containers for chemicals.
SPEC(C)-1.1.1 NFPA 6-2.1.3(a)1 *OSHA SpEMP-1*	Identify the responsibility to provide information on the hazards and harmful effects of specific chemicals.

SPEC(C)-1.1.2
NFPA 6-2.1.3(a)2
OSHA SpEMP-1

Identify the responsibility to provide information on the characteristics of specific containers for chemicals.

SPEC(C)-1.2
NFPA 6-2.1.3(b)
OSHA SpEMP-2

Describe the responsibility to assist the incident commander in planning a response to an emergency involving chemicals or containers for chemicals.

SPEC(C)-1.2.1
NFPA 6-2.1.3(b)1
OSHA SpEMP-2

Identify the responsibility to provide information on the potential response options for chemicals or containers for chemicals.

Analyzing the Incident
Providing Information on the Hazards and Harmful Effects of Specific Chemicals

SPEC(C)-2
NFPA 6-2.2.1
OSHA SpEMP-1

Given a specific chemical(s) used in his or her organization's area of specialization and the appropriate material safety data sheet (MSDS) or other appropriate resource, advise the incident commander of the chemical's hazards and harmful effects.

SPEC(C)-2.1
NFPA 6-2.2.1.1
OSHA SpEMP-1

Identify the following hazard information from the material safety data sheet (MSDS) or other appropriate resource:
(a)Physical and chemical characteristics
(b)Physical hazards of the chemical (including fire and explosion hazards)
(c)Health hazards of the chemical
(d)Signs and symptoms of exposure
(e)Routes of entry
(f)Permissible exposure limits
(g)Reactivity hazards
(h)Environmental concerns

SPEC(C)-2.2
NFPA 6-2.2.1.2
OSHA SpEMP-1

Identify how to contact CHEMTREC/CANUTEC/SETIQ.

SPEC(C)-2.3
NFPA 6-2.2.1.3
OSHA SpEMP-1

Identify the resources available from CHEMTREC/CANUTEC/SETIQ.

SPEC(C)-2.4
NFPA 6-2.2.1.4
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify additional resources of hazard information, including a method of contact.

Analyzing the Incident
Providing Information on Characteristics of Specific Containers

SPEC(C)-3
NFPA 6-2.2.2
OSHA SpEMP-1

Given examples of facility and transportation containers for chemicals in their organization's area of specialization, advise the incident commander of the characteristics of the containers.

SPEC(C)-3.1
NFPA 6-2.2.2.1
OSHA SpEMP-1

Given examples of various containers for chemicals used in his or her organization's area of specialization, identify each container by name.

SPEC(C)-3.2
NFPA 6-2.2.2.2
OSHA SpEMP-1

Given examples of facility and transportation containers for chemicals in their organization's area of specialization, identify the markings that differentiate one container from another.

SPEC(C)-3.3
NFPA 6-2.2.2.3
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify the resources available that can provide information about the characteristics of the container.

Planning the Response

Providing Information on Potential Response Options for Specific Chemicals

SPEC(C)-4
NFPA 6-2.3.1
OSHA SpEMP-2

Given a specific chemical used in their organization's area of specialization and an appropriate material safety data sheet (MSDS) or other appropriate resource, advise the incident commander of the response information for that chemical.

SPEC(C)-4.1
NFPA 6-2.3.1.1
OSHA SpEMP-2

Given a specific chemical used in their organization's area of specialization and an appropriate (MSDS), obtain the following response information:

(a)Precautions for safe handling, including hygiene practices, protective measures, and procedures for cleanup of spills/leaks

(b)Applicable control measures, including personal protective equipment

(c)Emergency and first aid procedures

SPEC(C)-4.2
NFPA 6-2.3.1.2
OSHA SpEMP-2

Given his or her organization's emergency response plan and SOP's, identify additional resources for obtaining response information.

Private Sector Specialist Employee B

SPEC(B)-1 NFPA 6-3.1.3 *OSHA SpEMP-1,2,3*	Given a simulated incident involving hazardous materials within the individual area of specialization, define the roles and responsibilities of the private sector specialist employee B.
SPEC(B)-1.1 NFPA 6-3.1.3(a) *OSHA SpEMP-1*	Describe the responsibility to assist the incident commander in analyzing the magnitude of an incident involving chemicals or containers for chemicals.
SPEC(B)-1.1.1 NFPA 6-3.1.3(a)1 *OSHA SpEMP-1*	Identify the responsibility to provide and interpret information on the hazards and harmful effects.
SPEC(B)-1.1.2 NFPA 6-3.1.3(a)2 *OSHA SpEMP-1*	Identify the responsibility to provide and interpret information on the characteristics of specific containers.
SPEC(B)-1.1.3 NFPA 6-3.1.3(a)3 *OSHA SpEMP-1*	Identify the responsibility to provide information on concentrations of chemicals from exposure monitoring, dispersion modeling, or any other predictive method.
SPEC(B)-1.2 NFPA 6-3.1.3(b) *OSHA SpEMP-2*	Describe the responsibility to assist the incident commander in planning a response to an incident involving chemicals or containers for chemicals.
SPEC(B)-1.2.1 NFPA 6-3.1.3(b)1 *OSHA SpEMP-2*	Identify the responsibility to provide information on the potential response options and their consequences for specific chemicals or containers for chemicals.
SPEC(B)-1.2.2 NFPA 6-3.1.3(b)2 *OSHA SpEMP-2*	Identify the responsibility to provide information on the personal protective equipment requirements for a specific chemical.
SPEC(B)-1.2.3 NFPA 6-3.1.3(b)3 *OSHA SpEMP-2*	Identify the responsibility to provide information on the decontamination methods for a specific chemical.
SPEC(B)-1.2.4 NFPA 6-3.1.3(b)4 *OSHA SpEMP-1,2,3*	Identify the responsibility to provide information on the federal/provincial regulations that relate to the handling and disposal of a specific chemical.
SPEC(B)-1.2.5 NFPA 6-3.1.3(b)5 *OSHA SpEMP-2,3*	Identify the responsibility to develop a plan of action (within the capabilities of the available resources), including safety considerations, for handling chemicals or containers for chemicals consistent with their organization's emergency response plan and standard operating procedures.
SPEC(B)-1.3 NFPA 6-3.1.3(c) *OSHA SpEMP-3*	Describe the responsibility to implement the planned response, as developed with the incident commander, for chemicals or containers for chemicals, consistent with their organization's emergency response plan and standard operating procedures and within the capabilities of the available resources.

SPEC(B)-1.3.1
NFPA 6-3.1.3(c)1
OSHA SpEMP-3

Identify the responsibility to perform response options specified in the plan of action, as agreed upon with the incident commander and consistent with their organization's emergency response plan and standard operating procedures (within the capabilities of the available resources).

SPEC(B)-1.3.2
NFPA 6-3.1.3(c)2
OSHA SpEMP-3

Identify the responsibility to don, work in, and doff personal protective equipment needed to implement the response options.

SPEC(B)-1.4
NFPA 6-3.1.3(d)
OSHA SpEMP-2,3

Describe the responsibility to assist the incident commander to evaluate the results of implementing the planned response.

SPEC(B)-1.4.1
NFPA 6-3.1.3(d)1
OSHA SpEMP-2,3

Identify the responsibility to provide feedback on the effectiveness of the response options taken.

SPEC(B)-1.4.2
NFPA 6-3.1.3(d)2
OSHA SpEMP-2,3

Identify the responsibility to provide reporting and subsequent documentation of the incident involving chemicals as required.

Analyzing the Incident

Providing and Interpreting Information on Hazards of Specific Chemicals

SPEC(B)-2
NFPA 6-3.2.1
OSHA SpEMP-1

Given a specific chemical within their individual area of specialization and an appropriate material safety data sheet (MSDS) or other appropriate resource, advise the incident commander of the chemical's hazards and harmful effects and the potential consequences based on the incident.

SPEC(B)-2.1
NFPA 6-3.2.1.1
OSHA SpEMP-1

Given a specific chemical, identify and interpret the following hazard information:
(a)Physical and chemical characteristics
(b)Physical hazards of the chemical (including fire and explosion hazards)
(c)Health hazards of the chemical
(d)Signs and symptoms of exposure
(e)Routes of entry
(f)Permissible exposure limits
(g)Reactivity hazards
(h)Environmental concerns

SPEC(B)-2.2
NFPA 6-3.2.1.2
OSHA SpEMP-1

Given examples of specific chemicals and the appropriate resources (as identified in their organization's emergency response plan and standard operating procedures), predict the potential behavior of the chemicals based on the damage found, including the consequences of that behavior.

SPEC(B)-2.3
NFPA 6-3.2.1.3
OSHA SpEMP-1

Identify the general types of hazard information available from the other resources identified in their organization's emergency response plan and standard operating procedures.

Analyzing the Incident
Providing Information on Characteristics of Specific Containers

SPEC(B)-3
NFPA 6-3.2.2
OSHA SpEMP-1

Given a container for specific chemicals, advise the incident commander of the characteristics and potential behavior of that container.

SPEC(B)-3.1
NFPA 6-3.2.2.1
OSHA SpEMP-1

Given examples of containers for specific chemicals, identify the purpose and operation of the closures found on those containers.

SPEC(B)-3.2
NFPA 6-3.2.2.2
OSHA SpEMP-1

Given a chemical container, list the types of damage that could occur.

SPEC(B)-3.3
NFPA 6-3.2.2.3
OSHA SpEMP-1

Given examples of containers for specific chemicals and the appropriate resources (as identified in their organization's emergency response plan and standard operating procedures), predict the potential behavior of the containers and the consequences, based on the damage found.

SPEC(B)-3.4
NFPA 6-3.2.2.4
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) knowledgeable in the design, construction, and damage assessment of containers for chemicals.

Analyzing the Incident
Providing Information on Concentrations of Chemicals

SPEC(B)-4
NFPA 6-3.2.3
OSHA SpEMP-1

Given a chemical and the applicable monitoring equipment provided by their organization for that chemical or the available predictive capabilities (e.g., dispersion modeling, exposure modeling), advise the incident commander of the concentrations of the released chemical and the implications of that information to the incident.

SPEC(B)-4.1
NFPA 6-3.2.3.1
OSHA SpEMP-1

Identify the appropriate monitoring equipment for a chemical used in his or her individual area of specialization.

SPEC(B)-4.2
NFPA 6-3.2.3.2
OSHA SpEMP-1

Use the appropriate monitoring equipment provided by their organization to determine the actual concentrations of a specific chemical.

SPEC(B)-4.3
NFPA 6-3.2.3.3
OSHA SpEMP-1

Given information on the concentrations of a chemical used in their organization, interpret the significance of that concentration information to the incident relative to the hazards and harmful effects of the chemical.

SPEC(B)-4.4
NFPA 6-3.2.3.4
OSHA SpEMP-1

Demonstrate field calibration and testing procedures, as necessary, for the monitoring equipment provided by their organization.

SPEC(B)-4.5
NFPA 6-3.2.3.5
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify the resources (including a method of contact) capable of providing monitoring equipment, dispersion modeling, or monitoring services.

Planning the Response
Providing Information on Potential Response Options and Consequences for Specific Chemicals

SPEC(B)-5
NFPA 6-3.3.1
OSHA SpEMP-2

Given specific chemicals or containers within their individual area of specialization and the appropriate resources, advise the incident commander of the potential response options and their consequences.

SPEC(B)-5.1
NFPA 6-3.3.1.1
OSHA SpEMP-2

Given a specific chemical and an appropriate material safety data sheet (MSDS), identify and interpret the following response information:

(a) Precautions for safe handling, including hygiene practices, protective measures, and procedures for cleanup of spills or leaks

(b) Applicable control measures, including personal protective equipment

(c) Emergency and first aid procedures

SPEC(B)-5.2
NFPA 6-3.3.1.2
OSHA SpEMP-2

Given their organization's emergency response plan and standard operating procedures, identify additional resources for interpreting response information for a chemical.

SPEC(B)-5.3
NFPA 6-3.3.1.3
OSHA SpEMP-2

Describe the advantages and limitations of the potential response options for a specific chemical.

SPEC(B)-5.4
NFPA 6-3.3.1.4
OSHA SpEMP-2

Given their organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) capable of:

(a) Repairing containers for chemicals

(b) Removing the contents of containers for chemicals

(c) Cleanup and disposal of chemicals or containers for chemicals

Planning the Response
Providing Information on Personal Protective Equipment Requirements

SPEC(B)-6
NFPA 6-3.3.2
OSHA SpEMP-3

Given specific chemicals or containers for chemicals within their individual area of specialization and the appropriate resources, advise the incident commander of the appropriate personal protective equipment necessary for various response options.

SPEC(B)-6.1
NFPA 6-3.3.2.1
OSHA SpEMP-3

Given a specific chemical and an appropriate material safety data sheet (MSDS), identify personal protective equipment, including the materials of construction, that will be compatible with that chemical.

SPEC(B)-6.2
NFPA 6-3.3.2.2
OSHA SpEMP-3

Given their organization's emergency response plan and standard operating procedures, identify other appropriate resources (including a method of contact) capable of identifying the personal protective equipment that is compatible with a specific chemical.

SPEC(B)-6.3
NFPA 6-3.3.2.3
OSHA SpEMP-3

Given an incident involving a specific chemical and the response options for that problem, determine whether the personal protective equipment provided by the organization is appropriate for the options presented.

Planning the Response
Providing Information on Decontamination Methods

SPEC(B)-7 NFPA 6-3.3.3 *OSHA SpEMP-3*	Given a specific chemical within their individual area of specialization and the available resources, identify appropriate decontamination methods for various response options.
SPEC(B)-7.1 NFPA 6-3.3.3.1 *OSHA SpEMP-3*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, obtain the potential methods for removing or neutralizing that chemical.
SPEC(B)-7.2 NFPA 6-3.3.3.2 *OSHA SpEMP-3*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, identify the circumstances under which disposal of contaminated equipment would be necessary.
SPEC(B)-7.3 NFPA 6-3.3.3.3 *OSHA SpEMP-3*	Given their organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) capable of identifying potential decontamination methods.

Planning the Response
Providing Information on Handling and Disposal Regulations

SPEC(B)-8 NFPA 6-3.3.4 *OSHA SpEMP-2*	Given a specific chemical within their area of specialization and the available resources, advise the incident commander of the federal or provincial regulations that relate to the handling, transportation, and disposal of that chemical.
SPEC(B)-8.1 NFPA 6-3.3.4.1 *OSHA SpEMP-2*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, identify federal or provincial regulations that apply to the handling, transportation, and disposal of that chemical.
SPEC(B)-8.2 NFPA 6-3.3.4.2 *OSHA SpEMP-2*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, identify the agencies (including a method of contact) responsible for compliance with the federal or provincial regulations that apply to the handling, transportation, and disposal of a specific chemical.
SPEC(B)-8.3 NFPA 6-3.3.4.3 *OSHA SpEMP-2*	Given their organization's emergency response plan and standard operating procedures, identify resources for information pertaining to federal or provincial regulations relative to the handling and disposal of a specific chemical.

Planning the Response
Developing a Plan of Action

SPEC(B)-9 NFPA 6-3.3.5 *OSHA SpEMP-2*	Given a simulated incident involving chemicals or containers used in their individual area of specialization, develop a plan of action (in conjunction with the incident commander), consistent with their organization's emergency response plan and standard operating procedures, for handling chemicals or containers in that incident. The plan of action developed shall be within the capabilities of the available resources and shall include safety considerations.
SPEC(B)-9.1 NFPA 6-3.3.5.1 *OSHA SpEMP-2*	Given the organization's emergency response plan and standard operating procedures, identify the process for development of a plan of action, including safety considerations.

Implementing the Planned Response
Performing Response Options Specified in the Plan of Action

SPEC(B)-10
NFPA 6-3.4.1
OSHA SpEMP-3

Given an assignment by the incident commander in their individual area of specialization, perform the assigned actions consistent with their organization's emergency response plan and standard operating procedures.

SPEC(B)-10.1
NFPA 6-3.4.1.1
OSHA SpEMP-3

Perform assigned tasks consistent with their organization's emergency response plan and standard operating procedures and the available personnel, tools, and equipment (including personal protective equipment), including the following:

(a)Confinement activities
(b)Containment activities
(c)Product removal activities

SPEC(B)-10.2
NFPA 6-3.4.1.2
OSHA SpEMP-1

Identify factors that can affect an individual's ability to perform the assigned tasks.

Implementing the Planned Response
Using Personal Protective Equipment

SPEC(B)-11
NFPA 6-3.4.2
OSHA SpEMP-3

Given an assignment within their individual area of specialization, don, work in, and doff the appropriate personal protective equipment needed to implement the assigned response options, consistent with their organization's emergency response plan and standard operating procedures.

SPEC(B)-11.1
NFPA 6-3.4.2.1
OSHA SpEMP-3

Don, work in, and doff the appropriate respiratory protection and protective clothing for the assigned tasks.

SPEC(B)-11.2
NFPA 6-3.4.2.2
OSHA SpEMP-3

Identify the safety considerations for personnel wearing personal protective equipment, including:

(a)Buddy system
(b)Backup personnel
(c)Symptoms of heat and cold stress
(d)Limitations of personnel working in personal protective equipment
(e)Indications of material degradation of chemical-protective clothing
(f)Physical and psychological stresses on the wearer
(g)Emergency procedures and hand signals

SPEC(B)-11.3
NFPA 6-3.4.2.3
OSHA SpEMP-3

Identify the procedures for cleaning, sanitizing, and inspecting personal protective equipment provided by the organization.

Evaluating Progress
Providing an Evaluation of the Effectiveness of Selected Response Options

SPEC(B)-12
NFPA 6-3.5.1
OSHA SpEMP-3

Given an incident involving specific chemicals or containers for chemicals within their individual area of specialization, advise the incident commander of the effectiveness of the selected response options.

SPEC(B)-12.1
NFPA 6-3.5.1.1
OSHA SpEMP-3

Identify the criteria for evaluating whether or not the selected response options are effective in accomplishing the objectives.

SPEC(B)-12.2 Identify the circumstances when it would be prudent to withdraw from a chemical incident.
NFPA 6-3.5.1.2
OSHA SpEMP-3

Evaluating Progress
Reporting and Documenting the Incident

SPEC(B)-13 Given a simulated incident involving chemicals or containers for chemicals used in their individual area of specialization, complete the reporting and subsequent documentation requirements consistent with their organization's emergency response plan and standard operating procedures.
NFPA 6-3.5.2
OSHA SpEMP-1,2,3

SPEC(B)-13.1 Identify the importance of documentation (including training records, exposure records, incident reports, and critique reports) for an incident involving chemicals.
NFPA 6-3.5.2.1
OSHA SpEMP-1.2

SPEC(B)-13.2 Identify the steps used in keeping an activity log and exposure records.
NFPA 6-3.5.2.2
OSHA SpEMP-1,2

SPEC(B)-13.3 Identify the requirements for compiling incident reports.
NFPA 6-3.5.2.3
OSHA SpEMP-1,2

SPEC(B)-13.4 Identify the requirements for compiling hot zone entry and exit logs.
NFPA 6-3.5.2.4
OSHA SpEMP-2,3

SPEC(B)-13.5 Identify the requirements for compiling personal protective equipment logs.
NFPA 6-3.5.2.5
OSHA SpEMP-2,3

SPEC(B)-13.6 Identify the requirements for filing documents and maintaining records.
NFPA 6-3.5.2.6
OSHA SpEMP-2,3

Hazardous Materials

Incident Response Training Guidelines

Emergency Medical Service Responder Level 1

General Training Considerations

Introduction

Emergency medical service (EMS) responder Level 1 shall be trained to meet the requirements of the first responder at the awareness level, as defined in OSHA 1910.120(q)(6)(i) as well as the competencies recommended in this section. In addition, EMS responder Level 1 shall meet the training requirements of local occupational health and safety regulatory agencies or EPA, as appropriate for their jurisdiction.

In addition to being trained to the first responder awareness level, emergency medical service personnel who respond to hazardous materials incidents should be trained and receive regular continuing education to maintain competence in three areas: emergency medical technology, hazardous materials, and specialized topics such as hazardous materials toxicology, as approved by the authority having jurisdiction. The training program should be a comprehensive competency-based presentation of the required subject material with applicable hands-on sessions that demonstrate the newly acquired skills.

Definition

Emergency medical service responder Level 1 are persons who, in the course of their normal duties, may be called on to perform patient care activities in the cold zone at a hazardous materials incident. EMS responder Level 1 shall provide prehospital care *only* to those individuals who no longer pose a significant risk of secondary contamination, such as decontaminated patients in the cold zone.

Audience

EMS Level 1 training is appropriate for all emergency medical technicians, paramedics, and other health professionals who, in the course of their normal duties, may respond to hazardous materials emergencies either as a first responder or as on-site cold zone support to the incident command structure at an incident scene.

Related Health, Safety, and Performance Standards

OSHA 29 CFR 1910.120
EPA 40 CFR 311
NFPA 472
NFPA 473
NFPA 1561 Standards on Fire Department Incident Management System, 1995 Edition
U.S. Fire Administration Emergency Incident Rehabilitation Guide, FA-114

Recognized U.S. Department of Transportation, State, regional, or local training curricula should constitute the entry-level EMS preparation for continuing hazardous materials training. When a hazardous materials incident occurs, all EMS basic life-support-provider personnel responding should have been trained to the emergency medical technician A level or equivalent.

Appropriate Methodologies

EMS Level 1 training should include a combination of traditional classroom lecture with small-group activities, field exercises involving working with the incident command structure in simulated emergencies, and hands-on psychomotor skill training. Content instruction should focus on contamination hazards, treatment procedures, and incident scene roles and responsibilities. Trainee activities should focus on assessment and analysis of hazards and determination of appropriate procedures. Skill training should focus on implementing procedures. Written and practical examinations are highly recommended to measure achievement in initial training and refresher programs and to support the employer's responsibility that all EMS personnel are trained to competency before being called on to perform at emergencies. Table-top and field exercises should focus on acting out incident scene roles and on implementing procedures in a field environment. Refresher training should be conducted on a yearly basis and focus on technical updates to changes in response protocols, SOP's, and renewal of individual response skills.

General Training Considerations

The following resources are recommended to supplement the training process:

Local Emergency Response Plan
Standard Operating Procedures
Hawley's Condensed Chemical Dictionary, 11th Edition
OSHA 29 CFR 1910.120
Hazardous Chemical Data (U.S. Government)
National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards (U.S. Government)
Emergency Action Guides (Association of American Railroads)
NFPA 471, 472, and 473
Handbook of Toxic and Hazardous Chemicals and Carcinogens
Toxic Gases: First Aid and Medical Treatment
Haz/Mat Injuries (Bradford/Stutz)

SUMMARY: Emergency Medical Services Responder Level 1

Audience	Prerequisites	Training	Refresher
Large training audience. All paramedics and emergency medical technicians who respond to emergencies, including all transportation accidents, that may involve hazmat.	First Responder Awareness training.	- Classroom, physical skills lab, and simulator/field instruction, with emphasis on decision making and treatment. - Competencies: - Assessing incident scene hazards and risks of patient secondary contamination. - Incident scene response planning, including determining personal protective equipment needs and defining roles and responsibilities of EMS Level 1 responder. - Ability to perform EMS Level 1 patient preparation, care, and preparation for transport. - Ability to perform post-incident EMS reporting, documentation, and follow-up.	1. Technical updates. 2. Changes in response protocols and incident command system SOP's. 3. Renewal and retesting of incident scene decision making and cold zone treatment skills.

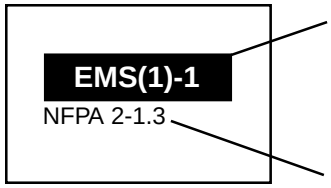
Recommended Training

For EMS Responder Level 1 Training

The following training objectives are recommended for emergency medical service responder Level 1. The primary source for this material is NFPA 473: Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents, Chapter 2 Competencies for EMS/HM Level 1 Responders.

In general, these recommended objectives are comparable in scope and concept to the general requirements of OSHA that all responding personnel be properly trained to perform their assigned roles in a hazardous materials emergency.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as EMS(1)-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA 473, Chapter 2.

Identification	***Recommended** Training Objectives*
EMS(1)-1 NFPA 2-1.3	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the emergency medical service responder Level 1.
EMS(1)-1.1 NFPA 2-1.3(a)	Describe the responsibility of the emergency medical service responder Level 1 to analyze a hazardous materials emergency to determine what risks are present to the provider and the patient.
EMS(1)-1.2 NFPA 2-1.3(b)	Describe the responsibility of the emergency medical service responder Level 1 to plan a response to provide the appropriate level of emergency medical care to persons involved in hazardous materials incidents.
EMS(1)-1.3 NFPA 2-1.3(c)	Describe the responsibility of the emergency medical service responder Level 1 to implement the planned response.
EMS(1)-1.4 NFPA 2-1.3(d)	Describe the responsibility of the emergency medical service responder Level 1 to terminate the incident
	Analyzing the Hazardous Materials Incident
EMS(1)-2 NFPA 2-2.1	Given an emergency involving hazardous materials, determine the hazards to the responder and the patient in that situation.

EMS(1)-2.1
NFPA 2-2.1(a)
Given an emergency involving hazardous materials, assess the nature and severity of the incident (size-up) as they pertain to EMS responsibilities at a hazardous materials incident with evaluation of available resources and a request for any needed assistance.

EMS(1)-2.2
NFPA 2-2.1(b)
Given an emergency involving hazardous materials, evaluate the environmental factors as they affect patient care.

EMS(1)-2.3
NFPA 2-2.1(c)
Identify the information resources available and how to access the following:
(a)Poison Control Center
(b)Medical control
(c)Material safety data sheets
(d)Reference guidebooks
(e)Hazardous materials data bases
(f)Technical information centers (CHEMTREC, NRC, etc.)
(g)Technical specialists
(h)Agency for Toxic Substances and Disease Registry (ATSDR)

EMS(1)-2.4
NFPA 2-2.1(d)
Given a pesticide label, identify and explain the significance of the following:
(a)Name of pesticide
(b)Signal word
(c)EPA registration number
(d)Precautionary statement
(e)Hazard statement
(f)Active ingredient

EMS(1)-3
NFPA 2-2.2
Given a hazardous materials incident with a patient(s), determine the risk of secondary contamination.

EMS(1)-3.1
NFPA 2-2.2(a)
Explain the basic toxicological principles relative to assessment and treatment of victims exposed to hazardous materials, including the following:
(a)Acute and delayed toxicity
(b)Routes of exposure to toxic materials
(c)Local and systemic effects
(d)Dose response as it relates to risk assessment
(e)Synergistic effects
(f)Health hazard as determined by assessing toxicity, exposure, and dose

EMS(1)-3.2
NFPA 2-2.2(b)
Describe how the chemical contamination of patients alters the principles of triage in hazardous materials incidents.

EMS(1)-3.3
NFPA 2-2.2(c)
Explain the need for patient decontamination procedures at hazardous materials incidents.

EMS(1)-3.4
NFPA 2-2.2(d)
Describe how the potential for secondary contamination determines the extent of patient decontamination required.

EMS(1)-3.5 NFPA 2-2.2(e)	Describe the way that personnel, personal protective clothing, apparatus, tools, and equipment become contaminated and the importance and limitations of decontamination procedures.
EMS(1)-3.6 NFPA 2-2.2(f)	Explain the decontamination procedures as defined by the authority having jurisdiction for patients, personnel, personal protective equipment, and apparatus at hazardous materials incidents.
EMS(1)-4	Advise the evaluator of the names of the hospital facilities in the local area capable of handling patients contaminated at a hazardous materials incident and the importance of this information.

Planning the Response

EMS(1)-5 NFPA 2-3.1	Given a plan of action by the incident commander, describe their role in a hazardous materials incident as identified in the local emergency response plan or organization's standard operating procedures.
EMS(1)-5.1 NFPA 2-3.1(a)	Given specific scenarios, describe the emergency medical component for the hazardous materials incident response plan as developed by the authority having jurisdiction.
EMS(1)-5.2 NFPA 2-3.1(b)	State the Level I responder's role within the hazardous materials response plan as developed by the authority having jurisdiction.
EMS(1)-5.3 NFPA 2-3.1(c)	State the Level I responder's role within the hazardous materials incident management system.
EMS(1)-6 NFPA 2-3.2	Given a hazardous materials incident, be able to plan a response to provide the appropriate level of emergency medical care, including the standard operating procedures for the medical management of persons exposed to hazardous materials, as specified by the authority having jurisdiction.
EMS(1)-6.1 NFPA 2-3.3	Given the name of the hazardous material and the type, duration, and extent of exposure and decontamination process, determine if available personal protective clothing and equipment are appropriate to implement the planned response.
EMS(1)-6.2 NFPA 2-3.3(a)	Describe the application, use, and limitations of the following: (a)Street clothing and work uniforms (b)Structural fire fighting protective clothing (c)Respiratory protective equipment (d)Chemical-protective clothing
EMS(1)-6.3 NFPA 2-3.4	Given a simulated hazardous materials incident, determine if available equipment and supplies are appropriate to implement the planned response and describe the equipment and supplies available to the Level I responder for the care and transportation of the hazardous materials incident patient.

Implementing the Planned Response

EMS(1)-7
NFPA 2-4.1
Given a plan for providing patient care at a hazardous materials incident, be able to perform the preparations necessary to receive the patient for treatment and transport.

EMS(1)-7.1
NFPA 2-4.1(a)
List the information that needs to be communicated to the Medical Control/Receiving facility regarding the hazardous materials incident, including the following:
(a)Type and nature of the incident
(b)Chemical involved and its physical state
(c)Number of potential patients

EMS(1)-7.2
NFPA 2-4.1(b)
Describe the procedure for preparing the vehicle and equipment for the patient.

EMS(1)-7.3
NFPA 2-4.1(c)
Demonstrate the proper donning, doffing, usage, and limitations of all personal protective equipment provided to the Level I responder by the authority having jurisdiction for use in their hazardous materials response activities.

EMS(1)-7.4
NFPA 2-4.1(d)
Describe the concept of patient transfer from the incident site to the decontamination area and then to the treatment area.

EMS(1)-8
NFPA 2-4.2
Given a patient from a hazardous materials incident, provide patient care consistent with the planned response and the organization's standard operating procedures.

EMS(1)-8.1
NFPA 2-4.2(a)
Describe how chemical contamination alters the assessment and care of the hazardous materials patient.

EMS(1)-8.2
NFPA 2-4.2(b)
List the common signs and symptoms and describe the EMS treatment protocols for the following:
(a)Corrosives (e.g., acid, alkali)
(b)Pulmonary irritants (e.g., ammonia, chlorine)
(c)Pesticides (e.g., organophosphates, carbamates)
(d)Chemical asphyxiants (e.g., cyanide, carbon monoxide)
(e)Hydrocarbon solvents (e.g., xylene, methylene chloride)

EMS(1)-8.3
NFPA 2-4.2(c)
Explain the potential risk with invasive procedures for hazardous materials patients.

EMS(1)-8.4
NFPA 2-4.2(d)
Demonstrate the ability to perform the following EMS functions within the incident management system during incidents involving multiple hazardous materials patients:
(a)EMS control
(b)Triage
(c)Treatment
(d)Disposition and transportation

EMS(1)-9
NFPA 2-4.3
Given a patient from a hazardous materials incident, transport the patient as specified in the local emergency response plan and the organization's standard operating procedures.

EMS(1)-9.1 NFPA 2-4.3(a)	Identify the capabilities of the medical facilities available in the local area to receive hazardous materials patients.
EMS(1)-9.2 NFPA 2-4.3(b)	Identify the acceptable vehicles available to transport hazardous materials patients from the treatment area to a receiving facility.
EMS(1)-9.3 NFPA 2-4.3(c)	List the pertinent information that needs to be communicated to the receiving facility, including the following: (a)Estimated time of arrival (b)Age/sex (c)Patient condition/chief complaint (d)Associated injuries (e)Routes, extent, and duration of chemical exposure (f)Pertinent medical history (g)Signs and symptoms (h)Vital signs (i)Treatment, including decontamination and patient response (j)Pertinent chemical characteristics
EMS(1)-9.4 NFPA 2-4.3(d)	Describe the actions necessary for the coordinated delivery of hazardous materials incidents patients to a receiving facility.
EMS(1)-9.5 NFPA 2-4.3(e)	Explain the special hazards associated with air transportation of patients exposed to hazardous materials
EMS(1)-10	Describe the patient decontamination process.

Terminating the Incident

EMS(1)-11 NFPA 2-5.1	Upon termination of the hazardous materials incident, complete the reporting, documentation, and EMS termination activities as required by the local emergency response plan or the organization's standard operating procedures.
EMS(1)-11.1 NFPA 2-5.1(a)	Given scenarios, list the information to be gathered regarding the exposure of the patient and the EMS provider and describe the proper reporting procedures, including the following: (a)Product information (b)Routes, extent, and duration of exposure (c)Actions taken to limit exposure and contamination (d)Treatment rendered (e)Patient condition and disposition
EMS(1)-11.2 NFPA 2-5.1(b)	Given scenarios, identify situations that can necessitate critical incident stress debriefing intervention.
EMS(1)-11.3 NFPA 2-5.1(c)	Describe the EMS provider's role in the post-incident critique.

Hazardous Materials

Incident Response Training Guidelines

Emergency Medical Service Responder Level 2

General Training Considerations

Introduction

Emergency medical service (EMS) responder Level 2 shall be trained to the competencies of the first responder at the awareness level; as defined in OSHA 1910.120(q)(6)(i), to the competencies of EMS Level 1 as defined in these guidelines and NFPA Standard 473, and to the competencies recommended in this section for EMS Level 2. In addition, EMS responders Level 2 shall meet the training requirements of local occupational health and safety agencies, OSHA, and EPA, as appropriate for their jurisdiction, and emergency medical technician A certification standards.

Decontamination of patients or rescue personnel is a critical task. These individuals have come in contact with a foreign agent that will cause either short- or long-term medical problems. Whether the ramifications of contact with the foreign agent are long-term, chronic or acute, the need to have medically trained personnel, emergency medical technicians, and paramedics conducting decontamination procedures is imperative and self-explanatory. Using certified emergency medical technicians and paramedics trained in hazardous materials to conduct the decontamination operation will result in a higher level of care and the ability to provide effective and efficient patient assessment and prehospital care that will benefit all who are involved with these types of operations.

Level 2 responders are expected to be able to analyze hazardous materials incidents to determine the magnitude of problem areas. They also are expected to plan a response and provide the appropriate level of emergency medical care and decontamination to persons involved in hazardous materials incidents, provide medical support to hazardous materials response personnel, and implement and terminate the response.

Definition

Emergency medical services responder Level 2 are persons who, in the course of their normal activities, may be called on to perform patient care and decontamination activities in the warm zone (the area where personnel and equipment decontamination and hot zone support take place) at hazardous materials incidents. Level 2 responders are called on to provide care to individuals who still pose a significant risk of secondary contamination. In addition, personnel at this level shall be able to coordinate EMS activities at a hazardous materials incident and provide medical support to and decontamination of hazardous materials response personnel.

Audience

EMS responder Level 2 may be public- or private-sector individuals charged with the responsibility of providing and coordinating EMS services at a hazardous materials scene. They include selected emergency medical technicians and paramedics as well as members of industrial fire brigades who are assigned patient care responsibility at a hazardous materials incident on-site or off-site.

Related Health, Safety, and Performance Standards

OSHA 29 CFR 1910.120
EPA 40 CFR 311
NFPA 472
NFPA 473
NFPA 1561 Standard on Fire Department Incident Management System, 1995 Edition
U.S. Fire Administration Emergency Incident Rehabilitation Guide, FA-114

Recognized DOT, State, regional, or local training curricula should constitute the entry-level EMS preparation for continuing hazardous materials training. When a hazardous materials incident occurs, all EMS basic life-support-provider personnel responding should have been trained to the emergency medical technician A level or equivalent.

Appropriate Methodologies

EMS Level 2 training should include a combination of traditional classroom lecture with small-group activities, field exercises involving working with the incident command structure in simulated emergencies, and hands-on psychomotor skill training. Content instruction should focus on contamination hazards, decontamination procedures, health monitoring treatment procedures, and incident scene roles and responsibilities. Trainee activities should focus on assessment and analysis of hazards and determination of appropriate procedures. Skill training should focus on implementing decontamination and patient care procedures and the use of appropriate personal protective equipment. Written and practical examinations are highly recommended to measure achievement in initial training and refresher programs and to support the employer's responsibility that all EMS Level 2 personnel be trained to competency before being called on to perform Level 2 functions at emergencies. Table-top and field exercises should focus on acting out incident scene roles and on implementing procedures in a field environment. Refresher training should be conducted on a yearly basis and should focus on technical updates, updates on changes in response protocols and SOP's, and renewal of individual skills in decontamination, patient treatment, and use of personal protective equipment.

SUMMARY: Emergency Medical Services Responder Level 2

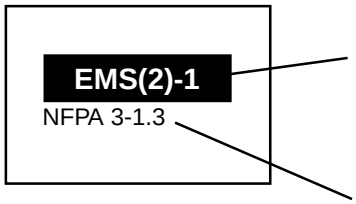
Audience	Prerequisites	Training	Refresher
Moderate size training audience. Paramedics and emergency medical technicians who may be called upon to conduct decontamination and patient care in the warm and hot zone of a hazardous materials incident scene.	1. First Responder Awareness training. 2. EMS Level 1 training.	- Classroom, physical skills lab, and simulator/field instruction, with emphasis on decision making and treatment skills. - Competencies: - Assessing incident scene hazards and risks of patient secondary contamination. - Incident scene response planning, including determining personal protective equipment needs and defining roles and responsibilities of the EMS Level 2 responder. - Ability to perform EMS Level 2 patient decontamination and treatment in the warm zone of an incident scene. - Ability to perform post-incident EMS reporting, documentation, and follow-up.	1. Technical updates. 2. Changes in response protocols and incident command system SOP's. 3. Renewal and retesting of incident scene decision making and warm zone decontamination and treatment skills.

Recommended Training

For EMS Responder Level 2 Training

The following training objectives are recommended for emergency medical service responder Level 2. The primary source for this material is NFPA 473: Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents, Chapter 3: Competencies for EMS/HM Level 2 Responders.

In general, these recommended objectives compare in scope and concept to the general requirements of OSHA that all responding personnel be properly trained to perform their assigned roles in a hazardous materials emergency.



Objective Identification Legend

This is the identification used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as EMS(2)-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA 473, Chapter 3.

Identification	***Recommended** Training Objectives*
EMS(2)-1 NFPA 3-1.3	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the emergency medical service responder Level 2.
EMS(2)-1.1 NFPA 3-1.3(a)	Describe the responsibility of the emergency medical service responder Level 2 to analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes.
EMS(2)-1.2 NFPA 3-1.3(b)	Describe the responsibility of the emergency medical service responder Level 2 to plan a response to provide the appropriate level of emergency medical care to persons involved in hazardous materials incidents and to provide medical support to hazardous materials response personnel.
EMS(2)-1.3 NFPA 3-1.3(c)	Describe the responsibility of the emergency medical service responder Level 2 to implement the planned response.
EMS(2)-1.4 NFPA 3-1.3(d)	Identify the responsibility of the emergency medical service responder Level 2 to terminate the incident.
	Analyzing the Hazardous Materials Incident
EMS(2)-2 NFPA 3-2.1	Given an emergency involving hazardous materials, determine the hazards to the responders and the patient in that situation.

EMS(2)-2.1
NFPA 3-2.1(a)

Define the following chemical and physical properties and describe their importance in the risk assessment process:

(a)Boiling point
(b)Flammable (explosive) limits
(c)Flash point
(d)Ignition temperature
(e)Specific gravity
(f)Vapor density
(g)Vapor pressure
(h)Water solubility

EMS(2)-2.2
NFPA 3-2.1(b)

Define alpha radiation, beta radiation, and gamma radiation.

EMS(2)-2.3
NFPA 3-2.1(c)

Define the following toxicological terms and explain their use in the risk assessment process:

(a)Threshold limit value (TLV-TWA)
(b)Lethal concentration and doses ($LD_{50/100}$)
(c)Parts per million/billion (ppm/ppb)
(d)Immediately dangerous to life and health (IDLH)
(e)Permissible exposure limit (PEL)
(f)Short-term exposure limit (TLV-STEL)
(g)Ceiling level (TLV-C)

EMS(2)-2.4
NFPA 3-2.1(d)

Given a specific hazardous material and using the information sources available to the Level II responder, demonstrate extracting appropriate information about the physical characteristics and chemical properties, hazards, and suggested medical response considerations for that material.

EMS(2)-3
NFPA 3-2.2

Given a hazardous materials incident with a patient(s), assess the patient and conditions to determine the risk of secondary contamination.

EMS(2)-3.1
NFPA 3-2.2(a)

Identify sources of technical information for the performance of patient decontamination.

EMS(2)-3.2
NFPA 3-2.2(b)

Identify the factors that influence the decision of when and where to treat the patient and the extent of patient care, including the following:

(a)Hazardous material toxicity
(b)Patient condition
(c)Availability of decontamination

Planning the Response

EMS(2)-4
NFPA 3-3.1

Given a plan of action by the incident commander, and a role in a hazardous materials incident as identified in the local emergency response plan or the organization's standard operating procedures, describe the importance of coordination between various agencies at the scene of hazardous materials incidents.

Recommended Training

EMS(2)-5
NFPA 3-3.2

Given a hazardous materials incident, plan a response to provide the appropriate level of emergency medical care to persons involved in hazardous materials incidents and to provide medical support to hazardous materials response personnel.

EMS(2)-5.1
NFPA 3-3.2(a)

Given a simulated hazardous materials incident, assess the problem and formulate and implement a plan including the following:

(a) EMS control activities
(b) EMS component of an incident management system
(c) Medical monitoring of personnel utilizing chemical-protective and high temperature-protective clothing
(d) Triage of hazardous materials victims
(e) Medical treatment for chemically contaminated individuals
(f) Product and exposure information gathering and documentation

EMS(2)-5.2
NFPA 3-3.2(b)

Describe the importance of pre-emergency planning relating to specific sites.

EMS(2)-5.3
NFPA 3-3.2(c)

Describe the hazards and precautions to be observed when approaching a hazardous materials incident.

EMS(2)-5.4
NFPA 3-3.2(d)

Describe the considerations associated with the placement, location, and setup of the patient decontamination site.

EMS(2)-5.5
NFPA 3-3.2(e)

Explain the advantages and limitations of the following techniques of decontamination and how they are or are not applicable to patient decontamination:

(a) Absorption
(b) Chemical degradation
(c) Dilution
(d) Isolation

EMS(2)-5.6
NFPA 3-3.2(f)

Describe when it would be prudent to pull back from a hazardous materials incident.

EMS(2)-6
NFPA 3-3.3

Given the name of the hazardous material and the type, duration, and extent of exposure, determine if the protective clothing and equipment available to EMS personnel is appropriate to implement the planned response.

EMS(2)-6.1
NFPA 3-3.3(a)

Identify the advantages and dangers of search and rescue missions at hazardous materials incidents.

EMS(2)-6.2
NFPA 3-3.3(b)

Identify the advantages and hazards associated with the rescue, extrication, and removal of a victim from a hazardous materials incident.

EMS(2)-6.3
NFPA 3-3.3(c)

Describe the types, application, use, and limitations of protective clothing used by EMS personnel at hazardous materials incidents.

EMS(2)-6.4
NFPA 3-3.3(d)

Demonstrate how to interpret a chemical compatibility chart for chemical-protective clothing.

Implementing the Planned Response

EMS(2)-7 NFPA 3-4.1	Given a plan for providing patient care at a hazardous materials incident, perform the preparations necessary to receive the patient for treatment and transport and demonstrate the proper donning, doffing, and usage of all personal protective equipment provided to the Level II responder by the authority having jurisdiction.
EMS(2)-8 NFPA 3-4.2	At the scene of a hazardous materials incident, provide or coordinate the patient care.
EMS(2)-8.1 NFPA 3-4.2(a)	Given a simulated hazardous materials incident and using local available resources, demonstrate the implementation of the patient decontamination procedure.
EMS(2)-8.2 NFPA 3-4.2(b)	Explain the principles of emergency decontamination and its application for critically ill patients.
EMS(2)-8.3 NFPA 3-4.2(c)	Demonstrate the ability to coordinate patient care activities, including treatment, disposition, and transportation of patients.
EMS(2)-9 NFPA 3-4.3	Given a simulated hazardous materials incident, demonstrate the ability to establish and manage the EMS component of an incident management system.
EMS(2)-10 NFPA 3-4.4	Given a simulated hazardous materials incident, perform medical support of hazardous materials incident response personnel.
EMS(2)-10.1 NFPA 3-4.4(a)	Explain the components of pre-entry and post-entry assessment, including the following: (a)Vital signs (b)Body weight (c)General health (d)Neurological status (e)Electrocardiographic rhythm strip, if available
EMS(2)-10.2 NFPA 3-4.4(b)	Explain the following factors and how they influence heat stress for hazardous materials response personnel: (a)Hydration (b)Physical fitness (c)Environmental factors (d)Activity levels (e)Level of PPE (f)Duration of entry
EMS(2)-10.3 NFPA 3-4.4(c)	Explain the medical monitoring protocols and demonstrate medical monitoring procedures for personnel at the scene of a hazardous materials incident.

EMS(2)-10.4 NFPA 3-4.4(d)	Describe the criteria for site selection of a medical monitoring station.
EMS(2)-10.5 NFPA 3-4.4(e)	Demonstrate the ability to set up and operate a medical monitoring station.
EMS(2)-10.6 NFPA 3-4.4(f)	Demonstrate the ability to interpret and analyze data obtained from medical monitoring of hazardous materials response personnel.
EMS(2)-10.7 NFPA 3-4.4(g)	Given a simulated hazardous materials incident, demonstrate proper documentation of medical monitoring.

Terminating the Incident

EMS(2)-11 NFPA 3-5.1	Upon termination of the hazardous materials incident, complete the reporting, documentation, and EMS termination activities as required by the local emergency response plan or the organization's standard operating procedures.
EMS(2)-11.1 NFPA 3-5.1(a)	Describe the information regarding incident EMS activities that needs to be relayed through the chain of command to the incident commander.
EMS(2)-11.2 NFPA 3-5.1(b)	Describe the activities required in terminating the EMS component of a hazardous materials incident.
EMS(2)-11.3 NFPA 3-5.1(c)	Describe the process and demonstrate the ability to conduct the EMS portion of an incident critique
EMS(2)-11.4 NFPA 3-5.1(d)	Explain the process of making revisions to EMS operating procedures and response capabilities as a result of information learned
EMS(2)-12	Describe the necessary procedures required to decontaminate all equipment to render it back in service and the proper disposal of equipment that requires the same.

Hazardous Materials

Incident Response Training Guidelines

Hospital Personnel

General Training Considerations

Introduction

Hospital Emergency Department Personnel face a difficult task when dealing with contaminated patients. Contaminated patients may arrive at the hospital by their own means or be transported by Emergency Medical Services providers when field decontamination is impractical. It is essential that all emergency departments have the capability to recognize, assess, and begin the treatment of hazardous material patients, including those who are contaminated with a hazardous substance. Furthermore, the hospital emergency department must assure the protection of their own medical staff and the continued well being of hospital residents. The hospital is an integral emergency responder when dealing with a chemical emergency or disaster and training programs must address the unique and valuable role played by the communities acute residential care system.

At a minimum, hospital personnel must be able to analyze the situation, assess patient conditions and problems, take the necessary steps to assure medical provider safety, attempt identification of the offending chemical substance, and initiate the decontamination and medical care process.

Definition

Hospital emergency department personnel are persons who, in the course of their normal work activities, may be called upon to perform patient care and decontamination within the confines of the hospital. These personnel in the performance of their duties may be exposed to a significant risk of secondary contamination from the patients for which they are charged to provide care. In addition these personnel may be called upon to assist pre-hospital personnel requiring technical assistance in the area of patient decontamination.

Audience

Hospital emergency department personnel may be public or private-sector individuals charged with the responsibility of coordinating and providing medical treatment of patients who have been exposed to or contaminated by hazardous materials. They include selected emergency department staff including physicians, nurses at all levels, aids, support staff as well as any other individual assigned to care for patients received from a hazardous materials emergency on or off site.

Related Health, Safety, and Performance Standards

OSHA 29 CFR 1910.120
OSHA 29 CFR 1910.134
OSHA 29 CFR 1910.1030
EPA 40 CFR 311
Joint Commission for the Accreditation of Healthcare Organizations (JCAHO)

Recognized DOT, State, regional, or local training curricula should be a basis for hospital personnel preparation and continuing hazardous materials training and education. The Joint Commission for the Accreditation of Healthcare Organizations has requirements which hospitals must meet to receive accreditation.

Hospital accreditation in most states is a necessary requirement for the facility to receive a hospital license and insurance reimbursements. The JCAHO requirements relating to hazardous materials and hospital community planning are reflected in the following training objectives.

Appropriate Methodologies

Hospital Emergency Department personnel training should include a combination of traditional classroom lecture with small-group activities, field exercises involving working in simulated emergencies, and hands-on psychomotor skill training. Content instruction should focus on contamination hazard, decontamination procedures, patient flow within the hospital, health treatment procedures and roles and responsibilities. Trainee activities should focus on assessment and analysis of hazards and determination of appropriate procedures. Skill training should focus on implementing decontamination and patient care procedures, use of reference materials and the use of appropriate personal protective equipment. Written and practical examinations are highly recommended to measure achievement in initial training and refresher programs and to support the employer's responsibility that all emergency department personnel be trained to competency before being called upon to perform at emergencies. Exercises should focus on acting out the assigned roles and on implementing procedures in the hospital environment. Refresher training should be conducted on a yearly basis and should focus on technical updates, updates on changes in hospital protocol and procedures, and renewal of individual skills in decontamination, patient treatment, and use of personnel protective equipment.

SUMMARY:Hospital Personnel

Audience	Prerequisites	Training	Refresher
Moderate in size. Hospital emergency department personnel who may coordinate or provide treatment to patients who have been exposed to or contaminated by hazardous materials.	None, beyond professional competencies associated with role in hospital emergency department.	- Classroom, lab instruction with simulated emergencies, hands-on psychomotor skill training. - Competencies: - Knowledge of contamination hazards, decontamination procedures, patient flow, health treatment procedures, roles and responsibilities. - Ability to implement decontamination, use of reference materials, and use of personal protective equipment.	1. Technical updates. 2. Updates on changes in hospital protocols and procedures. 3. Renewal of skills in decontamination, patient treatment, and use of personal protective equipment.

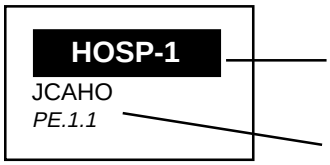
Recommended Training

For Hospital Emergency Department Personnel

The following training objectives are recommended for hospital emergency department personnel. The primary source for this material is the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) standards for handling contaminated patients. The following training material is not only recommended for emergency department physicians and nursing staff but for all hospital personnel who may have a role in the hospital response.

In general, these recommended objectives compare in scope and concept to the general requirements of OSHA that all personnel which may be required to respond to hazardous material releases be properly trained to perform their assigned roles in times of emergencies.

Objective Identification Legend



This is the identification objective used in this document. It matches the identification code used in course assessment references.

This indicates which components of the JCAHO standards are addressed by this objective.

Identification	***Recommended** Training Objectives*
HOSP-1	Describe the ways in which a medical center or hospital can become involved in a hazardous material event or response effort.
	Decontamination of Patients
HOSP-2	Describe some of the key issues involved in the reception of a patient contaminated by or exposed to a chemical substance.
HOSP-2.1 JCAHO *PE.1.1*	Presented with a contaminated patient(s), determine the initial screening or assessment of the patient(s) physical, psychological, and social status to determine the need for care, the type of care to be provided, and the need for any further assessment.
HOSP-2.2 JCAHO *PE.1.2, PE.1.2.1, PE.1.2.2*	Determine the scope and intensity of any further patient assessment which is determined by: (a)The patient's diagnosis; (b)The care setting
HOSP-2.3 JCAHO *PE.1.4*	Given a contaminated patient(s), identify the diagnostic testing, including laboratory and other invasive and noninvasive diagnostic and imaging procedures, relevant to the determination of the patient(s) health care or treatment needs and to the actual care or treatment of the patient(s) to be performed.

HOSP-2.4	JCAHO *IM.9, IM.9.1, IM.9.2, IM.10.1*	List and describe the hospital's hazardous materials information resources and assure that they are authoritative and up to date.
HOSP-2.5		Define the following toxicological terms as they relate to the treatment of a contaminated patient in the hospital setting: (a)Threshold Limit Value - TLV (b)Threshold Limit Value - Time Weighted Average -TLV-TWA (c)Threshold Limit Value - Short-term Exposure Limit - TLV-STEL (d)Threshold Limit Value - Ceiling - TLV-C (e)Immediately Dangerous to Life and Health - IDLH (f)Lethal Dose 50 - LD50 (g)Lethal Concentration 50 - LC50
HOSP-2.6		Define the effect chemicals may have on a contaminated patient using the method of Dose-Response Relationship.
HOSP-2.7		Describe the routes by which chemicals may enter the body.
HOSP-2.8		List the target organ systems which may be effected in the contaminated patient.
HOSP-2.9		List the areas of the body that are most likely to have greater route of chemical absorption into the body.
HOSP-2.10	JCAHO *PE.1.1, PE.2.1, PE.2.2, PE.2.3, PE.2.4*	Demonstrate that each patient is reassessed at regularly specified times related to the patient's course of treatment to determine the patient's response to treatment; (a)When a significant change occurs in the patient's condition; and (b)When a significant change occurs in the patient's diagnosis.
HOSP-2.11	JCAHO *PE.3.1, PE.4.2*	Demonstrate that patient care decisions are based on the identified patient needs and on care priorities.
HOSP-2.12	JCAHO *PE.4.3*	Describe the need for nursing personnel to assess the patient's need for nursing care in all settings where nursing care is to be provided.
HOSP-2.13	JCAHO *IM.9.2, IM.10.1*	Describe the methods used to assure the pharmacy, medical, and nursing staff have access to poison control information.
HOSP-2.14		List at least four resources available to hospital providers to assist with the treatment of a contaminated patient.
HOSP-2.15		List the equipment needed in the emergency department to provide for effective decontamination of a patient.

HOSP-2.16 List and describe the proper usage of Personnel Protective Equipment (PPE) used by emergency department staff during patient decontamination procedures.

HOSP-2.17 Demonstrate the ability to determine the need for, and if required, the use of special respiratory protection for the emergency department staff and the patient during decontamination procedures.

Planning For The Response

HOSP-3 Describe the need for the hospital to develop emergency response plans.
JCAHO
LD.1.1, EC.1.6

HOSP-3.1 Identify the necessity for the hospital administrators to communicate the hospitals plan(s) throughout the organization.
JCAHO
LD.1.2

HOSP-3.2 Identify the areas in the hospital plan(s) that include patient care services in response to identified patient needs and is consistent with the organization's mission and ability to provide service.
JCAHO
LD.1.3

HOSP-3.3 Identify the hospital personnel, and, as appropriate, community leaders and organizations which need to collaborate to design services to be provided by the hospital.
JCAHO
LD.1.3.1

HOSP-3.4 Identify the need to design into the plan patient care services to be provided throughout the hospital organization that are appropriate to the scope and level of care required by the patients that may be served.
JCAHO
LD.1.3.2

HOSP-3.5 Describe the setting in the planning process for performance-improvement priorities and identify how the hospital adjusts priorities in response to unusual or urgent events.
JCAHO
LD.1.4

HOSP-3.6 Identify the need for the scope of service provided by each department as defined in writing and is approved by the hospitals administration, medical staff, or both, as appropriate.
JCAHO
LD.1.7

Implementing The Planned Response

HOSP-4 Describe the hospitals documented management plan(s) for the environment of care to be provided during a hazardous materials emergency that considers all factors of the emergency response.
JCAHO
EC.1.2

HOSP-4.1 Describe the safety factors outlined in the plan as listed below:

(a) Ensuring that emergency service areas are clearly identified;
(b) Establishing a risk-assessment program that proactively evaluates the impact on patient and public safety of the buildings, grounds, equipment, occupants, and internal physical systems;
(c) Requiring an annual evaluation of the objectives, scope, performance, and effectiveness of the documented safety management plan.

HOSP-4.2	JCAHO *EC.1.4*	Describe the security factors outlined in the plan listed below: (a)Providing access control, as appropriate, to sensitive areas; (b)Provide vehicular access to emergency service areas; (c)Providing traffic control for emergency service areas.
HOSP-4.3	JCAHO *EC.1.6*	Describe the factors outlined in the plan related to Hazardous Wastes within the hospital listed below: (a)Monitor and disposing of hazardous wastes (b)Reporting and investigating all hazardous materials or waste spills and exposures or other incidents that involve patients, visitors, personnel, or property.
HOSP-4.4	JCAHO *EC.1.6*	List and describe the factors outlined in the hospital's emergency preparedness program.
HOSP-4.4.1	JCAHO *EC.1.6*	Describe the procedure for establishing, supporting and maintaining an emergency preparedness program.
HOSP-4.4.2	JCAHO *EC.1.6.a*	Describe the steps for implementing specific procedures in response to a variety of disasters and/or emergencies, internal and external of the hospital.
HOSP-4.4.3	JCAHO *EC.1.6.b*	Describe the ways of defining and, when appropriate, integrating the hospital's role with community-wide emergency preparedness efforts.
HOSP-4.4.4	JCAHO *EC.1.6.c*	Describe the procedure for notifying the proper authorities outside the hospital in an emergency.
HOSP-4.4.5	JCAHO *EC.1.6.d*	Describe the procedure for notifying hospital personnel of an implementation of the emergency preparedness plan.
HOSP-4.4.6	JCAHO *EC.1.6.m*	Describe the ways of defining, where appropriate, alternate roles and responsibilities of hospital personnel during disasters and/or emergencies.
HOSP-4.4.7	JCAHO *EC.1.6.e*	Describe the procedure for assigning available personnel to reflect current staffing patterns within the hospital during times of disaster and/or emergency.
HOSP-4.4.8	JCAHO *EC.1.6.f*	Describe the procedures for the management of space, supplies and security during disasters and/or emergencies.
HOSP-4.5	JCAHO *EC.1.6.g*	Describe the procedures for evacuating the entire facility if the organization's environment cannot continue to support adequate patient care and treatment.

Recommended Training

HOSP-4.5.1	JCAHO *EC.1.6.h*	Describe the procedures for establishing an alternate care site if the hospital environment cannot continue to support adequate patient care and treatment.
HOSP-4.5.2	JCAHO *EC.1.6.l*	Describe the ability to identify, where appropriate, available facilities for radioactive or chemical isolation and decontamination if additional resources are needed.
HOSP-4.5.3	JCAHO *EC.1.6.i*	Describe the procedures for managing patients during disasters or emergencies, including the scheduling, modification, or discontinuation of services, control of patient information, and admission, transfer and discharge of patients.
HOSP-4.5.4	JCAHO *EC.1.6.n*	Describe the requirements for an annual evaluation of the objectives, scope, performance, and effectiveness of the hospital's documented emergency preparedness management plan.
HOSP-4.6		List the specialized medical equipment needed for treating patients and/or responding to hazardous materials emergencies including selecting and acquiring the medical equipment.

Special Topics

Radiological Response Training Issues

The following is intended to provide a rationale for or elaborate on training objectives recommended in addition to those in NFPA 472 regarding radioactive materials. This information should not apply to Radiological Response Teams.

Integration

Response to radioactive materials incidents is often considered a training topic separate from response to incidents involving other hazard classes. In many ways, this view is inappropriate and inefficient. Proper response techniques for radioactive materials are generally similar to or the same as those for other hazard classes. In any event, they differ in no greater degree than, for instance, those for flammable materials might differ from those for corrosives.

Separate radiological training is certainly better than no training; however, one drawback is that its being separated from other training may cause responders to view radioactive materials as more dangerous or difficult to deal with than other hazards. This is usually not the case. Another problem is that separate radiological training may also consume time and resources out of proportion to the magnitude of the local radiological risk. It is recommended that radiological training be integrated as much as possible into the overall hazardous materials response training program at each level.

Training Priorities

Time and resources available for hazardous materials emergency response training are limited. This makes it necessary to prioritize training topics to maximize the benefits. These training programs should be designed to respond to the presence and magnitude of risks. For example, gasoline and other flammable liquids are universally shipped, stored, and utilized nationwide. Accident records indicate that they are often released and cause harm. Thus, it is reasonable to devote a proportionally large amount of training time and resources to this hazard class. Accidents involving radioactive materials are rare. In transportation, where public emergency responders usually have the largest role, large-quantity releases have been virtually nonexistent. Small releases occur occasionally but are extremely rare. In fact, in the entire history of radioactive material shipping there has never been a release that resulted in injury or loss of life caused by radiation. Unless local hazard analysis and planning indicate a greater than normal risk regarding radioactive materials, highly specialized or extensive radiological response training for most personnel probably is not justified. There are, however, certain unique topics and concepts that should be taught at various training levels to ensure appropriate response actions when radioactive materials incidents do occur.

The specific additional recommendations made are not intended to cover comprehensively all the material that should be presented concerning radioactive materials. It is assumed that the subject of radioactive materials will be covered in the same manner as that recommended for all other hazard classes. The topics and points recommended are included because they are unique to radioactive materials, often overlooked, and particularly important.

All Training Levels

Rescue and Emergency Medical Care: In training for competencies under Implementing the Planned Response, as outlined in NFPA 472, specific topics are generally keyed to emergency response plans or standard operating procedures. These often call for responders at all training levels to respond in a defensive manner from the time the presence of hazardous materials is detected until product identity and

condition have been clearly determined. The term defensive is taken to mean that the responder will carry out only those actions that do not require risking exposure by entering the immediate vicinity of an actual, possible, or potential release. Responders should not enter the scene even to carry out life-saving activities. It is recommended that organizations and jurisdictions consider formulating plans and designing training that would allow for the following:

> Emergency responders who would normally carry out immediate rescue or render emergency medical care to any accident victims whose lives are threatened by factors other than radioactive material should do so when radioactive material in a *transportation* incident is the only significant hazardous material threat. These actions should be implemented while reasonable precautions are taken to avoid contact with radioactive materials or their containers. They should also be executed to minimize the amount of time responders spend in the hot zone, consistent with effective response. This means that even responders trained only to the awareness level would carry out these actions if that were their usual duty. It also means that these actions would be carried out in the absence of:
>
> - knowledge about the condition of containers or the presence or absence of a release,
> - specialized protective clothing and respiratory protection (although skin and respiratory protection should be worn if immediately available), and
> - specialized radiological dosimeters and monitoring gear (although such gear should be used if immediately available).

Only if it were known that radiation exposure exceeding accepted guidelines would occur would responders consider withholding lifesaving care (see EPA *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents* [EPA 400-R-92-001] for current guidelines) .

The rationale for this recommendation is as follows:

Large-quantity shipments of radioactive materials are packaged in containers designed and tested to withstand accident conditions. Accident history bears out the effectiveness of this packaging. Small-quantity shipments are packaged in containers that have released their contents in accidents. However, these quantities are unlikely to pose a life-threatening health hazard to responders who take the precautions outlined above. Again, accident history confirms this premise. Trauma injuries and other life-threatening conditions common to transportation accidents, therefore, pose a much greater risk than do radioactive materials. Thousands die each year due to trauma injuries received in transportation accidents, and many more would die if responders did not provide immediate rescue and emergency medical service. On the other hand, not one responder or accident victim has ever died or even been seriously injured as a result of a radiological release during transportation.

It is important to emphasize that the above argument is not intended to mean that hot zone activities are free of radiation-related risk. Some appreciable portion of radioactive materials shipments are potentially lethally hazardous, and the probability of release can never be reduced to zero. Accident history demonstrates, however, that such risk is small and well within the range of risks considered “acceptable” by virtually all response organizations. Consider that scores of responders are killed or injured each year in simply responding to the scene of an accident. Steps are taken to minimize the danger as much as possible, but this risk must be accepted at some level if responders are to do their jobs.

The concern addressed by this recommendation is that accident victims may die because of unwillingness to expose responders to a risk that is actually lower than that already taken in simply coming to the accident scene. If this recommendation is adopted, the above rationale should be presented clearly in training.

Responder at the Awareness Level

In addition to the general information included under Analyzing the Incident, as outlined in NFPA 472, it is recommended that the following receive emphasis:

- Transportation labels and shipping papers for radioactive materials are required to show the identity of the radionuclide(s) and the amount of activity in packages.

- Additional information required on radioactive materials shipping papers includes the physical and chemical form of the material and other useful information not required for other hazard classes. The terms "special form" and "Type B" indicate that radioactive materials are contained in packagings that have been designed and tested to withstand accident conditions.
- Radiation cannot be detected by the senses.
- Symptoms of harmful radiation exposure do not appear immediately and would generally be delayed for a minimum of several hours.

First Responder at the Operations Level

Hazardous materials response plans and standard operating procedures commonly call for decontamination, if necessary, of all persons before they leave the scene of an actual or suspected release, including injured persons being transported for medical care. There is concern that contamination may harm the victim or may be transferred to responders and emergency medical personnel, ambulances and other equipment, emergency room personnel, and the emergency room. This is a legitimate concern that is often not adequately covered in training and preparation for hazardous materials incidents. For *transportation* incidents when radioactive materials are the hazard class of concern, the following is recommended:

Hospital emergency room personnel should be equipped for and receive specialized training in techniques for detecting, controlling, and removing radiological contamination.

Emergency response personnel should be trained to:

- Limit decontamination activities *for victims with serious or life-threatening injuries* to removal of clothing known or suspected to be contaminated

- Package the victim in a manner that will prevent the spread of contamination during transportation

- Notify the emergency room that a contaminated or possibly contaminated victim is in route

- Give the emergency room any available information concerning the identity and nature of the contaminant.

The rationale for these recommendations is as follows:

As outlined above, transportation packaging regulations make releases from large-quantity radioactive material containers extremely unlikely. Releases from small-quantity packagings are more probable, but the amount released is unlikely to pose a threat to life. This means that concerns about *possible* radiological contamination probably will be unfounded. Any contaminants on victims with life-threatening injuries will most probably be of less concern than the injuries. Therefore, efforts to carry out on-scene decontamination other than as outlined above may be counterproductive in that they will delay needed medical care. This is particularly true because the use of appropriate radiological monitoring gear is necessary for effective decontamination and such gear is very often not immediately available at the scene.

An additional concern is that attempting to remove contamination from the skin may actually facilitate internalization unless done by or under the supervision of a physician. Not only might contamination inadvertently be transferred to breaks in the skin, but it is also possible that the decontamination process could convert contaminants to a form that could be absorbed through the skin. In the quantities likely to be encountered at transportation incidents, internal contamination is a *much* greater threat than external contamination.

Training for competencies under Analyzing the Incident should give emphasis to the following topics, in addition to those outlined in NFPA 472 for this function:

- General testing requirements for "Type A" and "Type B" radioactive material packages
- Shapes and characteristics of any specialized large-quantity radioactive materials packages commonly transported through the local jurisdiction, and
- The shape and characteristics of commonly used "industrial radiography sources."

Hazardous Materials Technician Level

In training for competencies under Analyzing the Incident, as outlined in NFPA 472, consideration should be given to the following:

- The radiation detection instruments that are commonly available to responders are distinctly limited in their ability to detect and measure some common types and energies of radia tion.

- The proper use of radiation detection instruments cannot be sufficiently covered in the limited time that can justifiably be devoted to it according to the priorities that prevail in most locales.

- Incidents involving radioactive materials are rare. Responders are not likely to gain practical experience in the use of these instruments that would reinforce their training.

For these reasons it is recommended that the training goal at this level be limited to providing responders with an ability to use radiation detection instruments in a defensive manner. Instruments should be used only to help responders avoid radiation exposure, such as when carrying out necessary, life-saving response activities. It is recommended that responders at this level not be expected to use instruments to detect releases, identify materials, quantitate radiation, or otherwise "investigate" the condition of radioactive materials and their packages.

Issues in Hazardous Materials Incident Recovery/Cleanup

The addition of objectives that address tactical considerations for minimizing the recovery/cleanup process has merit for several reasons.

Improved Handling of the Incident

The fundamental priorities for all emergency responders who respond to hazardous materials incidents are first, protecting life, second, protecting the environment, and last, protecting property and equipment.

Because protection of the environment is second only to the protection of life, the tactical considerations used to handle a hazardous materials emergency must be selected based on the overall effect those tactics will have on the environment.

In formulating tactical considerations aimed at minimizing impact to the environment, in many situations the emergency responders are simultaneously improving the recovery potential and minimizing the cleanup that is required. For example, an incident commander or hazardous materials group supervisor may choose to erect a portable sump to catch a leaking flammable liquid. This particular tactical action will:

- Prevent the spread of the flammable liquid into the environment, thus increasing the level of protection to the environment and minimizing the amount of environmental cleanup required;
- Reduce the hazards of the incident by allowing pooling of the material, thereby reducing the surface area that can evolve flammable vapors;
- Facilitate an improved recovery of the product by having a vacuum truck recover the spilled flammable liquid directly from the portable sump; and
- Allow for recycling of the recovered product, thus reducing the costs to the spiller.

The tactical decisions of the incident commanders and hazardous material group supervisors can negatively affect both the environment and the recovery and cleanup process. The failure of an incident commander or hazardous materials group supervisor to make the correct decision is usually the result of lack of experience in alternative methods. It is common for incident commanders and hazardous materials group supervisors to use techniques based on their structural fire-fighting or flammable liquid and gas fire-fighting methods. These generally involves using water or foam, each of which provides a medium for increasing the size of the spill, spreading the spill, and increasing the damage on both the environment and the recovery/cleanup process.

Unless terminal objectives are identified, incident commanders and hazardous materials group supervisors will make tactical decisions that negatively affect both the environment and the recovery and cleanup process. Instructional materials used to increase the skills of incident commanders and hazardous materials group supervisors should provide the basis for identifying and using the proper tactical decisions.
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Emerging Legal Trends

Another significant reason for using tactical considerations that minimize the impact on the recovery/cleanup process is the legal trend occurring in cost recovery litigation. Because the costs involved in handling a hazardous materials incident are routinely assessed against the spiller, lawyers defending spillers has developed tactics to provide relief to the spiller. This relief attempts to have some of the recovery and cleanup costs transferred from the spiller to the emergency responders when it can be demonstrated that the tactics used by the emergency responders resulted in increased costs.

For example, an incident commander or hazardous materials group supervisor might choose to allow a leaking hazardous material to enter a storm drain instead of attempting to dike the product to keep the product above ground. As a result, the spiller now must have a cleanup company remove the product from the storm drain at a considerable cost. In the ensuing litigation, the attorney for the spiller demonstrates the difference between the actual costs incurred as a result of the actions taken by the emergency responders and those that would have been incurred had the emergency responders kept the product from entering the storm drain. In scenarios of this type, the courts are ruling, with increasing frequency, that the spiller is only responsible for the costs of the recovery/cleanup resulting from the emergency responders used nationally recognized practices. The difference between the actual cost and the costs assessed against the spiller are then transferred to the emergency response agency.

Although this type of litigation action is occurring primarily in bellwether States like California, it is gaining recognition as a litigation technique that can be used effectively for defending and reducing the recovery and cleanup costs assessed against spillers. In addition, this type of litigation is resulting in the actions taken by emergency responders coming under increasing scrutiny to attempt to find errors and omissions that may be used to obtain relief for spillers.

Emergency responders are no longer exempt and protected from legal action when it can be shown that the negative outcomes resulting from their actions can be defined as contributory negligence.

Increasing Enforcement of EPA Regulations

Another purpose for identifying response/recovery terminal objectives that will lead to the development of training in this area is the increasing enforcement by EPA of the Resource Conservation and Recovery Act (RCRA). RCRA clearly states that, after an emergency ends and the recovery and cleanup process begins, emergency responders are no longer exempt from compliance with the requirements of RCRA. As a result, after the emergency has ended, emergency responders must comply with RCRA or face a potential of a fine for noncompliance. An example is a situation where the emergency responders elect to sweep up an absorbed hazardous material that should be disposed of in a proper waste disposal site. Instead, the emergency responders choose to take the absorbent containing the regulated hazardous material and dispose of it in a common landfill dumpster.

The recovery/cleanup objectives have been defined to:

- Identify tactical considerations that minimize the effect of hazardous materials spills on the environment;
- Identify tactical considerations that minimize the financial impact on the recovery and cleanup process;
- Provide training that will protect emergency responders from litigation resulting from using improper tactics, based on past practices, in situations in which using more proactive techniques would have greatly reduced the cost of the recovery and cleanup; and
- Provide training that will protect emergency responders from litigation resulting from their engaging in practices that are not in compliance with RCRA.

How Recovery and Cleanup Tactical Considerations Are Driven by the Risk/Benefit Analysis Process

In addressing the tactical considerations that affect recovery and cleanup, the initial size-up and risk/benefit analysis of the tactical considerations identified early in an incident can have a major impact on the recovery/cleanup process later in the incident.

A quality risk/benefit analysis begins by assessing what the outcomes would be if the emergency responders did absolutely nothing and allowed the incident to go through natural stabilization. The emergency responders must ask themselves at this time, "If I do nothing, what are the outcomes?" In time, the incident will stabilize, and the outcomes will possibly include the loss of life, negative impact on the environment, and damage or loss of property and equipment.

After the emergency responders have identified the outcomes of natural stabilization, the next question they should ask themselves is, "Can I change the outcomes of natural stabilization?" If the answer to this question is "No," the emergency responders should only isolate the hazard area, deny entry, and protect people, the environment, and adjacent property and equipment from exposure.

If the answer is "Yes," then the next question to ask is, "What is the cost of my intervention?" At this time the emergency responders must clearly identify the cost of their intervention in terms of potential loss of life and negative effect on the environment and weigh that cost against the possible benefits of intervention.

If the risk/benefit analysis is conducted correctly, the tactical considerations used in tactical application should have a minimal effect on the recovery and cleanup process. If the risk/benefit analysis is either not conducted or is not conducted properly, the outcomes will have a major negative impact on life, the environment, property and equipment, and the recovery and cleanup process.

Trainees shall identify the negative effect on the recovery and cleanup process resulting from the following:

- Failure to catch a leaking hazardous material to prevent it from spreading into the environment.
- Failure to dike a leaking hazardous material to prevent it from spreading into the environment.
- Failure to dam a hazardous material that has entered a waterway to prevent it from spreading downstream into the environment.
- Failure to a redirect a leaking hazardous material away from a waterway to prevent it from entering the waterway and spreading downstream and affecting the environment.
- Failure to a redirect a leaking hazardous material away from an environmentally sensitive area to prevent it from entering the environmentally sensitive area and negatively impacting the environmentally sensitive area, e.g., a wetland.
- Failure to use absorbent materials to control a leaking hazardous material to prevent it from spreading into the environment.
- Engaging in foam application operations that result in spreading the spill when the product should have been allowed to continue to burn or fuel should have been added to the fire to increase the fire's temperature, e.g., pesticide fires.
- Engaging in fire extinguishing operations that allow water to become a vehicle that spreads the spill before having confinement operations in place.
- Engaging in fire extinguishing operations that allow water to become a vehicle that spreads the spill when the product should have been allowed to continue to burn, such as a burning material that cannot be extinguished by water.
- Engaging in dilution operations, in an attempt to neutralize a corrosive, and allowing the water to become a vehicle that spreads the corrosive before having confinement operations in place.

- Engaging in dilution operations, in an attempt to neutralize a corrosive, and allowing the water to become a vehicle that spreads the spill without recognizing that the volume of water needed to truly dilute the spill cannot be managed by the emergency responders (e.g., to dilute one gallon of a corrosive with pH of 1 to a pH of 6 requires 111,110 gallons of water).
- Failure to protect the environment, by using salvage covers or visqueen to cover exposed soil, when redirecting a spilled material into a ditch or other area being used as a catch basin or holding pond.
- Failure to segregate spilled oxidizers from spilled fuels, such as diesel fuel, to prevent a chemical reaction that results in an ignition and subsequent negative impact on the environment from the intensity of the fire or the spattering that may occur.
- Failure to segregate spilled materials that have oxidizing characteristics from spilled fuels, such as diesel fuel, to prevent a chemical reaction that results in an ignition and subsequent negative impact on the environment from the intensity of the fire.

The National Contingency Plan
for Federal Response to Oil Spills and Other Hazardous Materials Emergencies

Introduction

Response training for the local responder should include roles and responsibilities at emergencies involving oils spills and others releases of hazardous materials at which the Federal Government responds under the National Contingency Plan (NCP).

The role and responsibilities of the local responder at such incidents may differ from their normal response authorities and performance requirements because the nature of the incident may initiate a federal response in which federal authorities assume command and primary responsibility for the emergency. Such a federal response is prescribed in the NCP. To properly support effective response to these emergencies, it is essential that training for local responders include an understanding of the kinds of incidents that may involve federal response, the roles, responsibilities and authorities of the federal response organizations, the procedures for efficient transfer of command from the local responder to the federal authorities, and the role of the local response organization in the subsequent federal response.

Large oil and hazardous materials spills often involve overlapping jurisdictional responsibilities of the local response organizations and the federal response authorities under the NCP. Inland waterway emergencies such as barge/bridge accidents often involve local emergency personnel as the first responder. It is critical that all local emergency response personnel who may perform at the first responder awareness/operational levels at such incidents be trained in proper incident identification and notification procedures related to the NCP to ensure that all appropriate federal authorities are notified and mobilized in a timely fashion.

In emergencies involving immediate life safety or impending escalation of the release during the initial response, the local incident commander will typically establish a full response command structure and will undertake full defensive and offensive operations as appropriate under local authority. In the event that federal authorities then assume command of such incidents, it is critical that local responders be prepared to efficiently and properly effect transfer of command to best ensure the safety of responders currently on scene and continuation of operations to best protect the public interest, safety and health.

Additionally, complex incidents (such as a train derailment involving multiple hazardous substances at a bridge waterway crossing) will often involve local responders after command is transferred to federal authorities, either as subordinate units at the operational, technician or specialist levels or as joint incident commander in a unified command environment. In these events, it is critical that local responders be trained to understand the command structure that will be employed at the incident and the roles, responsibilities and authorities of the different agencies and organizations that will be involved.

The National Contingency Plan

The Federal Water Pollution Control Act (commonly referred to at the Clean Water Act) and the Oil Pollution Act of 1990 (OPA) provide authority for federal response to and command at incidents involving discharges of oil into or upon the navigable waters of the United States and adjoining shorelines, the waters of the contiguous zone, or waters of the exclusive economic zone, or which may affect the natural resources belonging to, pertaining to, or under the exclusive management authority of the United States. The National Contingency Plan (NCP), and especially the oil spill response appendix to the NCP, define the roles, responsibilities and scopes of authority of all federal, state and local organizations and responders involved in planning for and responding to these incidents. A complete copy of the Appendix to the National Contingency Plan: Oil Spill Response, is included in these guidelines in section 5: Hazardous Materials Standards and Laws.

The On-Scene Coordinator/Remedial Project Manager

The On-Scene Coordinator/Remedial Project Manager (OSC/RPM) is the federal official predesignated by EPA or the USCG to coordinate and direct federal responses to oil spill emergencies. The OSC/RPM monitors or directs all federal, state, local and private removal actions, or arranges for the removal of an actual or threatened oil discharge, removing and if necessary, requesting authority to destroy a vessel. Additionally, the Clean Water Act requires the OSC/RPM to direct all federal, state, local and private removal actions to any incident that poses a substantial threat to the public health or welfare.

The National Response System

The national response system (NRS) is the mechanism for coordinating response actions by all levels of government to oil spill and other hazardous materials emergencies where the response is directed under the authority of the On Scene Coordinator (OSC). The NRS is composed of the National Response Team (NRT), Regional Response Teams (RRTs), the On-scene Coordinator, Area Committees, and Special Teams and related support entities such as private firms and state and local governments.

Notification Responsibilities

Notification of an oil discharge, or of a release of a hazardous substance in an amount equal to or greater than the Reportable Quantity (RQ), must be made immediately to the NRC in accordance, respectively, with 33 CFR part 153, subpart b, and 40 CFR part 302.

The NRC acts as the single point-of-contact for all pollution-incident reporting and as the NRT communications center. The NRC receives and immediately relays telephone notices of discharges or releases to the appropriate predesignated Federal OSC and/or RPM, and advised the Federal Emergency Management Agency of a potential major disaster or evacuation situation.

Transfer of Command

Clear and complete transfer of command from the local incident commander to the OSC/RPM is very important. There are many financial and legal liabilities associated with spill response and clean-up that the OSC/RPM is both legally authorized and expertly trained to address, and it is in the best interests of the local response organization to pass these responsibilities to the OSC/RPM as soon and as completely as possible.

It is also important to note that the decision to transfer command from local or state authorities to federal authorities is usually and preferably a joint decision, but final authority rests with the OSC/RPM or designee, not by the local incident commander. The local incident commander can NOT legally refuse to transfer command or to release control of the local response units on scene at the time of transfer. Transfer of command should be formal, immediate, and either witnessed or in writing with time of transfer noted.

When the OSC/RPM notifies the local incident commander that the OSC is assuming control, the local incident commander should be prepared to provide an immediate situation report, including the following:

- Life safety hazards, if any
- Property and/or exposure hazards, if any
- Status of breaches and product release
- Defensive operations taken or in progress
- Offensive operations taken or in progress
- Call codes, location, assignments, number, qualifications, and time at incident of all resources at the scene.
- Staging status report
- Additional resources on call or en route.
- Organizations notified and representatives on site or en route.
- Additional unusual considerations that may impact strategic or tactical decision-making.

Command Structure

As defined in the NCP, the OSC/RPM will use the unified command system to coordinate resources at the incident. Organizations participating with the OSC/RPM in the unified command will vary, depending upon the incident and differences in area plans. The resources deployed at the incident will be organized under an Incident Command System that employs the traditional four strategic command categories: operations, logistics, planning, finance. Unity of command and the use of subordinate division and group structures are the same as for a typical emergency response, although the specific division and group responsibilities will be unique to the spill response and clean-up mission of the organization. Special teams, such as technical clean up teams, are often employed as self-contained organizational units in the response structure. Local responders familiar with response using the Incident Command System should have no difficulty in functioning as subordinate units in the command structure used by the OCS/RPM after assuming command.

Interface between the Local Incident Command System and the Federal Response under the NCP

The first federal official affiliated with an NRT member agency to arrive at the scene of a discharge or release will coordinate activities under the NCP. The federal official is authorized to initiate, in consultation with the predesignated OSC, any necessary action normally carried out by the OSC/RPM until the arrival of the predesignated federal OSC/RPM.

Once the federal EPA OSC has been contacted by the NRC, you can expect the OSC to follow these general guidelines. When the OSC receives a report of a discharge, actions normally should be taken in the following sequence:

Levels of Federal Contingency Plans (FCP)

There are three levels of the Federal Contingency Plans (FCP) that an Incident Commander must be aware of. A federal EPA OSC/RPM, depending on incident status, may act as a resource or may take charge of the incident and activate federal response resources as needed.

1. The NCP is officially called the National Oil and Hazardous Substance Pollution Contingency Plan. It provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The NCP is a guidance document for EPA and other federal agencies with response authority and responsibility under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and certain portions of the Clean Water Act (CWA). This plan is comprehensive in relating how these agencies are involved in a spectrum of pre-event plans for the on-scene response, the study, analysis and remediation, the financing, and the accountability.

2. The Regional Contingency Plans (RCP) are developed by the RRT, working with the States. RCPs were developed for each RCP standard federal region, Alaska, Oceanic in the Pacific, and the Caribbean to coordinate timely, effective response by various federal agencies and other organizations to discharges of oil or releases of hazardous substances, pollutants, or contaminants. RCPs shall, as appropriate, include information on all useful facilities and resources in the region, such as government , commercial, academic, and many other sources. To the greatest extent possible, RCPs shall follow the format of the NCP, the Area Contingency Plans (ACP) and coordinate with SERP and SARA Title III LERPs. RCPPs shall contain lines of demarcation between the inland and coastal zones, as mutually agreed upon by USCP and EPA.

3. The ACP, under the direction of an OSC and subject to approval by the lead agency, each Area Committee, in consultation with the appropriate RRTs, Coast Guard DRGs, NSFCC, SSCs, SERCs, and the LEPCs shall develop an ACP for its designated area. The ACP shall provide for a well-coordinated response that is integrated and compatible with state and local response plans.

Terrorism and Illicit Use of Hazardous Materials: First Responder Training Issues and Ramifications

Introduction

Terrorism is defined as the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, or social objectives. Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of the United States government or population without foreign direction. International terrorism involves terrorist activities committed by groups or individuals who are foreign-based and/or directed by countries or groups outside the United States or whose activities transcend national boundaries.

The illegal storage, transportation and disposal of hazardous materials and wastes pose a great risk to public sector responders. Historically, incidents involving hazardous materials and hazardous wastes have threatened public health and the environment resulting in efforts to enhance control of these materials. Federal, state and local governments have adopted standards and legislation in an attempt to reduce the risks to the public and the environment. The controls adopted have increased the complexities and costs of storage, transportation and disposal of these materials.

Federal Bureau of Investigation (FBI) statistics report a total of 249 terrorist incidents that occurred in the United States between the years 1980 and 1995. The February 20, 1993, bombing of the World Trade Center in New York City and the April 19, 1995, bombing of the Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma, illustrate that terrorism can occur any where within the United States. On March 20, 1995, the nerve agent sarin was released into the Tokyo, Japan subway system by a Japanese cult. This terrorist incident resulted in 12 fatalities and at least 5,510 injuries. One hundred thirty-five of the responders were injured after direct and indirect exposure to the nerve agent. Within the United States, incidents involving biological agents have been documented in major metropolitan areas as well as rural locations. These incidents have occurred on both the east and west coasts as well as central parts of the United States.

The Challenge to Public Sector Responders

Intentional releases of hazardous materials due to acts of terrorism or other criminal activities pose a unique challenge to public sector responders who respond to hazardous materials emergencies. Such intentional releases include, but are not limited to, illegal manufacture of drugs, improper disposal of hazardous materials and wastes, improvised explosive devices, manufacture and release of chemical agents and toxins, culture and dissemination of biological agents, and secondary events targeting public sector responders.

Responders to such incidents who are trained to traditional hazardous materials response competencies may encounter unique exposure risks, emergency control challenges, unusual materials, and complex mass casualty situations that are beyond their experience and current training. For example, public sector responders have been trained traditionally to identify hazardous materials based on outward warning signs and detection clues. However, at incidents involving terrorism or other criminal use of hazardous materials where there is attempted deception about the materials involved, clues such as occupancy location, container shapes, markings, and colors may not be consistent with traditional hazardous materials training. Consequently, rapid identification of the materials and type of problem may be difficult.

Terrorism and Illicit Use of Hazardous Materials

Responders to incidents involving terrorism may encounter unusual chemicals or biological agents or unusual uses of those hazardous materials that have not been addressed thoroughly in current hazardous materials training. For example, nuclear response training for first responders has traditionally been for major catastrophes (i.e., nuclear war and power plant emergencies), and not for small isolated terrorist events. As a second example, the high risk chemical and biological agents that might be involved in terrorist incidents may require unusual protocols and procedures for patient decontamination and treatment that are not addressed in current EMS training. As an additional example, some of the materials that may be involved have unusual dispersal characteristics that responders may not be trained to accommodate when determining of safe perimeters and public protection/evacuation requirements at the incident.

Current training for community emergency planning and preparedness strategies and existing response plans use risk predictions based upon known vulnerabilities and hazard identifications, such as commodity flow studies, fixed facility storage of material, etc. This allows responders to plan for the response prior to an emergency and to assess whether the response capability and resources in the area are sufficient to meet potential emergencies. However, terrorist and other illicit acts involving hazardous materials may occur in untraditional locations that are not normally thought of as high risk hazardous materials locations, such as public gathering places or remote transportation areas. As a result, current protocols for allocating response resources and preparing for hazardous materials emergencies may not allow sufficient response capability for terrorist-related hazardous materials emergencies.

Finally, hazardous materials emergencies involving terrorism or other illicit use of hazardous materials may involve additional and unusual risks to responders beyond those presented by the hazardous materials themselves. Public sector responders may be at additional risk due to secondary releases targeted at responders, primary releases that intentionally create extremely high risk rescue situations, and even to primary releases targeted at public response facilities.

The Challenge to Public Sector Response and Planning Organizations

Public sector response and planning organizations should examine all facets of their response system to ensure preparedness for response to incidents of terrorism and illicit use of hazardous materials. This review should include existing plans, operating procedures, equipment, training and exercises.

Plans should include:

- Consistency and interface with plans from all levels of government, specifically the Federal Response Plan (FRP) and the FRP Terrorism Annex;
- Presidential Decision Directive 39, specifically examining responsibility for crisis management and consequence management in their community;
- Unified command operations with all levels of government; and
- Thorough, in-depth plans for response to mass casualty chemical incidents.

Operating procedures should include:

- Command post operations including command post security, responder accountability, and on-site responder identification;
- Protection against secondary explosive devices and other secondary events;
- Responsibility for and support to crime scene operations, evidence collection and chain of custody; and
- Emergency decontamination at mass casualty chemical incidents.

Equipment should be evaluated to ensure appropriate protection and detection of nuclear, chemical and biological agents (NBC). Existing training, including annual refresher training, for all responders should be enhanced to include competencies for response to incidents involving terrorism or other illicit use of hazardous materials. Finally, agencies should identify a person or persons within their organization as their point of contact for issues regarding terrorism and the illicit use of hazardous materials. These persons should interface with appropriate response agencies to include EMS, fire, haz mat, and law enforcement.

Training Strategies

Training for public sector employees who respond to hazardous materials emergencies at the Awareness, Operations, Technician, EMS, and Incident Commander levels should include thorough instruction to prepare those responders to safely and efficiently respond to hazardous materials emergencies involving terrorism or other illicit use of hazardous materials.

For some metropolitan areas, the Department of Defense, the Department of Justice, and the United States Public Health Service are developing programs to provide in depth training and logistical support to assist public sector response organizations in preparing local responders to better prepare for terrorist-related hazardous materials emergencies. However, for most state, tribal, territory and local training systems outside these high risk metropolitan areas, training for response to such incidents should be addressed as additional competencies within current hazardous materials responder curriculums and training delivery systems.

This additional hazardous materials response training can be accomplished either through additional courses or through enhancement of current hazardous materials courses. Those training systems who have sufficient resources to do so and who would like to add additional courses to their curriculums should be advised that several courses will soon be available in this training area. Training programs are currently under development by several federal training providers, such as the National Fire Academy, and several state training organizations, such as the Virginia Department of Emergency Services, that address these competencies. Information regarding these and other programs and their availability for use will be provided as soon as available to HMEP grantees under separate cover through the HMEP response course assessment and catalog mechanism.

For many training providers, insufficient resources and limited access to responder training time may render impractical the use of additional, supplemental responder training courses addressing terrorism competencies. In that case, training providers may wish to consider addressing the needed training through modification to and enhancement of existing courses within their curriculums. As training providers develop updated modules and training resource materials for use in updating existing courses, information on these materials will be provided to HMEP grantees when available.

Responder Competencies

The National Fire Protection Association has issued a proposed tentative interim amendment to NFPA 472 that articulates additional responder competencies at the Awareness, Operations, Technician and Incident Commander levels for response to hazardous materials emergencies involving terrorism or other illicit use of hazardous materials. These competencies have been included in the recommended portions of the response training guidelines, *Guidelines for Public Sector Hazardous Materials Training*, and are also displayed below.

The domestic terrorism sub-committee for NFPA Standard 473, EMS Responder Levels 1 and 2, is also preparing supplemental competencies for EMS Level 1 and Level 2 responders to terrorist hazardous materials incidents. These competencies have been drafted and will be undergoing extensive national review and comment prior to their implementation. These draft competencies are displayed below for reference but will not be added to the recommended portions of the response training guidelines, Guidelines for Public Sector Hazardous Materials Training, until the competencies have been finalized by NFPA.

Note that the following are intended to supplement existing competencies for response as presented in NFPA 472 and 473, 1997 edition, and should be reviewed in context with the full set of competencies for each response level in order to properly depict the complete responder competency requirements for response to hazardous materials incidents involving terrorism or other illicit use of hazardous materials.

First Responder at the Awareness Level

Analyzing the Incident: *Detecting the Presence of Hazardous Materials.*

(new) 2-2.1.13

Identify types of locations that may become targets for criminal or terrorist activity using hazardous materials.

**The following are some examples of locations:*

(a) Public assembly
(b) Public buildings
(c) Mass transit systems
(d) Places with high economic impact
(e) Telecommunications facilities
(f) Places with historical or symbolic significance

(new) 2-2.1.14

Identify at least four indicators of possible criminal or terrorist activity involving hazardous materials.

**The following are some examples of indicators:*

(a) Hazardous materials or lab equipment that is not relevant to the occupancy
(b) Intentional release of hazardous materials
(c) Unexplained patterns of sudden onset illnesses or deaths
(d) Unusual odors or tastes
(e) Unexplained signs of skin, eye, or airway irritation
(f) Unusual security, locks, bars on windows, covered windows, and barbed wire
(g) Unexplained vapor clouds, mists, and plumes
(h) Patients twitching, tightness in chest, sweating, pin-point pupils (miosos), runny nose (rhinorrhea), and nasal vomiting.

Analyzing the Incident: *Initiating Protective Actions*

(new) 2-4.1.6

Identify the specific actions necessary when an incident is suspected to involve criminal or terrorist activity.

**The following are some examples of action:*

(a) Communicate the suspicion during the notification process
(b) Isolate potentially exposed people
(c) Document the initial observation
(Recommended by authors but not included with NFPA T.I.A.)
(d) Attempt to preserve evidence while performing operational duties

Analyzing the Incident: ***Initiating the Notification Process***

(add to) 2-4.2

Given either a facility or transportation scenario of hazardous materials, with or without criminal or terrorist activities, the first responder at the awareness level shall identify the appropriate initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures.

First Responder at the Operations Level

Analyzing the Incident: ***Surveying the Hazardous Materials Incident***
(new) 3-2.1.6

Identify at least three additional hazards that could be associated with an incident involving criminal or terrorist activity.

**The following are some examples of hazards:*

(a) Secondary events intended to incapacitate emergency responders
(b) Armed resistance
(c) Use of weapons
(d) Booby traps
(e) Secondary contamination form handling patients
(Recommended by authors but not included with NFPA T.I.A.)
(f) Hostage barricade situations

Analyzing the Incident: ***Collecting Hazard and Response Information***
(new) 3-2.2.6

Identify the type of assistance provided by the federal defense authorities, such as the Defense Logistics agency and the U.S. Army Operations Center, with respect to criminal or terrorist activities involving hazardous materials.

(new) 3-2.2.6.1

Identify the procedure for contacting federal authorities as specified in the local emergency response plan (ERP) or the organization's standard operating procedure (SOP).

Analyzing the Incident: ***Predicting the Behavior of a Material and its Container***
(new) 3-2.3.9

Given the following types of warfare agents, identify the corresponding DOT hazard class and division:

(a) Nerve agents
(b) Vesicants (blister agents)
(c) Blood agents
(d) Choking agents
(e) Irritants (riot control agents)
(f) Biological agents and toxins

**Some examples are as follows:*

	DOT Hazard Class
(a) Nerve agents	
Tuban (GA)	*6.1*
Sarin (GB)	*6.1*
Soman (GD)	*6.1*
V agent (VX)	*6.1*
(b) Vesicants (blister agents)	
Mustard (H)	*6.1*
Distilled mustard (HD)	*6.1*
Nitrogen mustard (HN)	*6.1*
Lewsite (L)	*6.1*
(c) Blood agents	
Hydrogen cyanide (AC)	*6.1*
Cyanogen chloride (CK)	*2.3*
(d) Choking agents	
Chlorine (CL)	*2.3*
Phosgene (CG)	*2.3*
(e) Irritants	
CS	*6.1*
CR	*6.1*
CN	*6.1*
OC	*2.2 (subsequent risk 6.1)*
(f) Biological agents and toxins	
Anthrax	*6.2*
Mycotoxin	*6.1 or 6.2*
Plague	*6.2*
Tularemia	*6.2*

Identifying Planning the Response: ***Emergency Decontamination Procedures***
(new) 3-3.4.5

Describe the procedure listed in the local ERP or the organization's SOP for decontamination of a large number of people exposed to hazardous materials.

Implementing the Planned Response: *Establishing and Enforcing Scene Control Procedures*
(add to) 3-4.1.6

Identify the items to be considered in a safety briefing prior to allowing personnel to work *at the following:*

(a) Hazardous materials incident

(b) Hazardous materials incident with criminal or terrorist activities

**The following are some examples of items to be considered in a safety briefing for criminal or terrorist related incidents:*

(a) Secondary events intended to incapacitate emergency responders
(b) Armed resistance
(c) Use of weapons
(d) Booby traps
(e) Secondary contamination form handling patients

Implementing the Planned Response: ***Performing Defensive Control Actions***
(new) 3-4.4.6

Describe procedures, such as those listed in the local Emergency Response Plan or the organization's Standard Operating Procedures, to preserve evidence at hazardous materials incidents involving suspected criminal or terrorist acts.

Technician

Analyzing the Incident: *Surveying the Hazardous Materials Incident*
(new) 4.2.1.1.6

For each of the following, describe a method that can be used to detect them:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Biological agents and toxin
(d)Irritants (riot control agents)

Analyzing the Incident: *Describing the Condition of the Container Involved in the Incident*
(add to) 4-2.2.2

Describe the following terms and explain their significance in the risk assessment process: Acid, caustic; (b) Air reactivity; (c) Boiling point; (d) Catalyst; (e) Chemical interactions; (f) Chemical reactivity; (g) Compound, mixture; (h) Concentration; (i) Corrosivity (pH); (j) Critical temperatures and pressure; (k) Expansion ratio; (l) Flammable (explosive) range (LEL & UEL); (m) Fire point; (n) Flash point; (o) Halogenated hydrocarbon; (p) Ignition (autoignition) temperature; (q) Inhibitor; (r) Instability; (s) Ionic & covalent compounds; (t) Maximum safe storage temperature (MSST); (u) Melting point/freezing point; (v) Miscibility; (w) Organic and inorganic; (x) Oxidation potential; (y) pH; (z) Physical state (solid, liquid, gas); (aa) Polymerization; (bb) Radioactivity; (cc) Saturated, unsaturated, and aromatic hydrocarbons; (dd) Self-accelerating decomposition temperature (SADT); (ee) Solution, slurry; (ff) Specific gravity; (gg) Strength; (hh) Sublimation; (ii) Temperature of product; (jj) Toxic products of combustion; (kk) Vapor density; (ll) Vapor pressure; (mm) Viscosity; (nn) Volatility; (oo) Water reactivity; (pp) Water solubility; *(qq) Nerve agents; (rr) Vesicants (blister agents); (ss) Biological agents and toxins; and (tt) Irritants (riot control agents).*

(new) 4-2.3.1.6

Demonstrate a method for collecting samples of the following:

(a) liquid
(b) solid
(c) gas

Planning the Response: *Developing a Plan of Action*

(new) 4-3.5.6

Identify the procedures, equipment, and safety precautions for collecting legal evidence at hazardous materials incidents.

Incident Commander

Analyzing the Incident: *Estimating Potential Outcomes*
(new) 5-2.2.4

Describe the health risks associated with the following:

(a)Nerve agents
(b)Vesicants (blister agents)
(c)Blood agents
(d)Choking agents
(e)Biological agents and toxins
(f)Irritants (riot control agents).

**Some examples are as follows (text added to NFPA 472 by HMEP author team):*

(a)Nerve agents

Liquids of low volatility that are rapidly absorbed through the eyes, lungs, or skin. They are highly toxic and have a NFPA 704 rating of 4/1/1 (tabun has a rating of 4/2/1). These materials inhibit acetycholinesterase (the enzyme that removes the acetyl-choline after a nerve impulse has been transmitted) in tissue, and their effects are caused by the resulting excess acetylcholine (the chemical that carries nerve impulses from one nerve cell to another). Health effect are rapid on set with symptoms of organophosphate (pesticide) poisoning.

Common Name	NFPA 704	Military Abbreviation	PEL/TWA mg/m³	LD50 (mg min/m³)
Sarin	411	GB	0.0001	70
Soman	411	GD	0.00003	70
Tabun	421	GA	0.0001	133
V agent	411	VX	0.0001	10 (percutaneous) 30 (vapor)

(b)Vesicants (blister agents)

Liquids of low volatility that are rapidly absorbed through tissue. They are highly toxic and have a NFPA 704 rating of 4/1/1. These materials cause sever burns to the skin, eyes, and tissue in the respiratory tract. Systemic poisoning can occur if significant exposure occurs,

Common Name	NFPA 704	Military Abbreviation	PEL/TWA mg/m³	LD50 (mg min/m³)
Mustard	411	H, HD	0.003	1500
Lewsite	411	L	0.003	1000-1500

(c)Blood Agents

Liquids under pressure that can interfere with the blood's ability to transfer oxygen to the cells. They are highly toxic and have a NFPA 704 rating of 4/4/2. Health effects are rapid onset of difficulty breathing, vomiting and headache.

(d)Choking Agents

Liquid under pressure that cause severe irritation to human tissue. Damage to respiratory tissue can result in pulmonary edema, congestive heart failure and death. These materials are highly toxic industrial chemicals.

(e)Biological agents and toxins

Biological Agents are generally divided into three groups:

Bacteria - single-celled organisms which cause a variety of diseases in animals, plants, and humans. They may also produce extremely potent toxins inside the body. Examples are Anthrax, Plague, Tularemia and Q fever. These agents show exposure symptoms in a period of 1-10 days and have an associated high fatality rate.

Viruses - much smaller than bacteria, and work inside individual cells. Examples are Smallpox, Venezuelan Equine Encephalitis and Viral Hemorrhagic Fever. Symptoms of exposure can be sudden to 1-3 days. Viral Hemorrhagic Fever is the most toxic of these viruses and is almost always fatal.

Toxins - potent poisons produced by a variety of living organisms including bacteria, plants, and animals. Examples are Botulinum Toxin, Staphylococcal Enterotoxin B, Ricin and Mycotoxins. Symptoms of exposure are 3 hours to 24 hours. These materials are the most toxic known substances, Botulinum Toxin is 100,000 times more toxic than Sarin, one of the well known opranophosphate nerve agents.

Common Name	*Days/Latency*	*Fatal*
Anthrax	*1-5*	*Yes*
Botulism	*2-3*	*Yes*
Cholera	*2-5*	*Yes*
Encephalitis	*2-5*	*Yes*
Plague	*1-3*	*Yes*
Tularemia	*1-10*	*Yes*

(f)Irritants (riot control agents)

solids with low vapor pressures and are dispersed in fine particles or in solution. Immediate onset of pain, burning, and irritation of exposed mucous membranes and skin. Exposure to these agents is almost never fatal to the healthy individual.

Planning the Response: *Approving the Level of Personal Protective Equipment*
(new) 5-3.3.5
Identify the limitations of military chemical/biological protective clothing.

Planning the Response: *Developing a Plan of Action*
(add to) 5-3.4.3
Given the local emergency response plan and/or the organization's standard operating procedures, identify which agency will perform the following:

(a)Receive the initial notification
(b)Provide secondary notification and activation of response agencies
(c)Make ongoing assessments of the situation
(d)Command on-scene personnel (incident management system)
(e)Coordinate support and mutual aid
(f)Provide law enforcement and on-scene security (crowd control)
(g)Provide traffic control and rerouting
(h)Provide resources for public safety protective action (evacuation or shelter in-place)
(i)Provide fire suppression services when appropriate
(j)Provide on-scene medical assistance (ambulance) and medical treatment (hospital)
(k)Provide public notification (warning)
(l)Provide public information (news media statements)
(m)Provide on-scene communications support
(n)Provide emergency on-scene decontamination when appropriate
(o)Provide operational-level hazard control services
(p)Provide technician-level hazard mitigation services
(q)Provide environmental remedial action ("cleanup") services

(r)Provide environmental monitoring
(s)Implement on-site accountability
(t)On-site responder identification
(u)Command post security
(v)Crime scene investigation
(w)Evidence collection and sampling

Terminating the Incident: *Reporting and Documenting the Hazardous Materials Incident*
(new) 5-6.4.6
Identify the procedures required for legal documentation and chain of custody/continuity described in the organization's standard operating procedure or the local emergency operating plan.

NOTE: The domestic terrorism sub-committee for NFPA Standard 473, EMS Responder Levels 1 and 2, is preparing supplemental competencies for EMS Level 1 and Level 2 responders to terrorist hazardous materials incidents. These competencies have been drafted and will be undergoing extensive national review and comment prior to their implementation. These draft competencies are displayed below for reference but will not be added to the recommended portions of the response training guidelines, Guidelines for Public Sector Hazardous Materials Training, until the competencies have been finalized by NFPA.

EMS Level 1

Analyzing the Incident
(new) 2-2.3
Identify types of locations that mav become targets for criminal or terrorist activity using hazardous materials.
*The following are some examples of locations:
(a) Public assembly
(b) Public buildings
(c) Mass transit systems
(d) Places with high economic impact
(e) Telecommunications facilities
(f) Places with historical or symbolic significance

(new) 2-2.4
Identify at least four indicators of possible criminal or terrorist activity involving hazardous materials.
*The following are some examples of indicators:
(a) Hazardous materials or lab equipment that is not relevant to the occupancy
(b) Intentional releases of hazardous materials
(c) Unexplained patterns of sudden onset of similar, non-traumatic illnesses or deaths. Pattern may be geographic, by employer, or other
(d) Unusual odors or tastes
(e) Unexplained signs of skin, eye or airway irritation
(i) Unusual security, locks, bars on windows, covered windows, and barbed wire
(g) Unexplained vapor clouds, mists, and plumes
(h) Patients twitching, tightness in chest, sweating, pin-point pupils (miosis), runny nose (rhinorrhea), and nausea/vomiting

Planning the Response
(new) 2-3.5
Identify the procedures, equipment, and safety precautions for collecting legal evidence at hazardous materials incidents.

Implementing the Planned Response
(add to) 2-4.2 (b)
List the common signs and symptoms and describe the EMS treatment protocols for the following:

(a) Corrosives (e.g., acid, alkali)
(b) Pulmonary irritants (e.g., ammonia, chlorine)
(c) Pesticides (e.g., organophosphates, carbamates)
(d) Chemical asphyxiants (e.g., cyanide, carbon monoxide)
(e) Hydrocarbon solvents (e.g., xylene, methylene chloride)
(f) Nerve agents
(g) Vesicants (blister agents)
(h) Blood agents (cyanide)
(i) Choking agents (pulmonary agents)
(j) Irritants (riot control agents)
(k) Biological agents and toxins
(l) Incapacitating agents (BZ, LSD)

(new) 2-4.4
Identify the specific actions necessary when an incident is suspected to involve criminal or terrorist activity
*The following are some examples of action:

(a) Communicate the suspicion during the notification process
(b) Isolate potentially exposed people
(c) Document the initial observation
(d) Attempt to preserve evidence while performing operational duties

(new) 2-4.5
Given either a facility or transportation scenario of hazardous materials with or without criminal or terrorist activities, the Level I EMS/HM Responder shall identify the appropriate initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures.

(new) 2-4.6
Given an incident involving the suspicion of a biological warfare agent, the EMT shall

(a) Identify the correct body substance isolation procedures to be followed
(b) Identify the proper decontamination procedures in accordance with their standard operating procedures or guidelines
(c) Identify the necessary post-exposure reporting

* This is important to facilitate post-exposure prophyllaxis when available

EMS Level 2

Analyzing the Incident
(new) 3-2.3
Given an emergency involving potential domestic terrorism, the Level II Responder shall determine the availability of basic tools for identification of the substance, detection devices appropriate to the substance, and where these detection devices are available locally.

Alternative Fuels

Background:

Since the oil embargo of the 1970's, alternative fuel development for vehicles has gained a greater portion of the market share. In addition, many cities are faced with EPA clean-air standards, expressing the need to convert vehicles to alternative cleaner burning fuels. As legislation , such as the Clean Air Act, starts to become fully implemented and states such as New York and California implement their vehicle emission standards the demand for motor vehicles that operate on fuels other than gasoline and diesel fuel will significantly increase.

Many vehicles today are operating on Liquefied Petroleum Gas (propane), Compressed Natural Gas (CNG), and Methanol or Ethanol fuels. The next major materials in the propulsion market will be electric power and Liquefied Natural Gas (LNG). Personal cars and fleets of all types ranging from taxi cabs, buses, delivery vehicles, and trains are operating today in most major cities and metropolitan areas on fuels other than the standard gasoline or diesel product. Manufacturers of cars, trucks, and buses using new fuels sources is on the increase. The flexible-fueled vehicles (FFV's) can run on gasoline or ethanol, compressed natural gas (CNG), liquefied hydrogen, propane, as well as electric batteries.

All vehicles, whether powered by alternative fuel or conventional gasoline, must be certified by the manufacturer to meet federal motor vehicle safety standards (FMVSS). Even though these standards for safety are met, there has been no method developed to identify the type of fuel the first responder would be faced with.

Challenges for Public Sector Response Training

The new systems pose a wide variety of new concerns to the emergency community of fire, police, and emergency medical personnel. Electric vehicles may be using large quantities of lead-acid batteries or generating electricity of 300 volts. Other vehicles may be using methanol or ethanol fuels which require special extinguishing agents to control fires. Compressed natural gas cylinders of 3,000 pounds pressure are now located in trunks of vehicles and railroad engines are now operating on Liquefied Natural Gas supplies being pulled behind the engine in a special tank car. Filling stations across the nation are installing compressor and cascade bottle fueling systems to fuel the natural gas vehicle. Small trailer mounted cascade systems are being pulled behind vehicles to provide roadside service to those vehicles that run out of natural gas. Utility companies in New York State will soon be marketing home compressors for vehicle owners to refuel their Compressed Natural Gas vehicle in their own garage. The National Highway Transportation Safety Board has found the issue of alternative fuels significant enough to publish a special awareness bulletin alerting responders of the potential dangers of the new fuels.

Emergency response personnel need to be trained to recognize or identify vehicles with alternative fuel systems and be trained in the appropriate safety issues associated with each new fuel system. Since all the systems are using hazardous materials, it is most appropriate that the training be covered under hazardous materials curriculum.

Alternative Fuels

Providers of hazardous materials responder training should develop training or enhance existing training at the Awareness, Operations, Technician and Incident Commander levels with additional material that addresses the following concepts:

- Recognition and identification of alternative-fueled vehicles
- Chemical and physical properties for the various fuels, i.e., LPG, LNG, LH, and electro-chemical cells (batteries)
- Special response procedures and operations needed for each alternative fuel, to include:
  - Personal Protective Equipment (PPE)
  - Suppressant Agents
  - Container Breaches (i.e. fuel or battery leakage)
  - Victim Extrication and Treatment
  - Scene Evacuation
  - Incident Management System (IMS) Special Considerations
  - Mitigation and Clean-Up Requirements
  - The potential for Boiling liquid/Expanding Vapor Explosion (BLEVE)

Carbon Monoxide Response

Fire department units may encounter carbon monoxide in many different situations and incident types. These settings can range from small dwellings to large industrial facilities. CO gas will be produced from all forms of combustion that involve carbon-based fuels. Concentrations will be dependent on the type of fuel and the form or efficiency of combustion. In recent years, these incidents have been on the increase in urban as well as rural areas.

Carbon monoxide is an invisible, odorless, tasteless, and colorless gas that has the same density as air and will not float or sink, but will disperse throughout a structure.

Carbon monoxide gas is a chemical asphyxiant and will replace oxygen in the bloodstream, resulting in suffocation. This gas also has a wide flammable range; from a lower explosive limit of 12.5% in air to an upper explosive limit of 74% in air. It has an ignition temperature of 1128 degrees Fahrenheit. The National Fire Protection Association (NFPA) fire diamond will show CO as a 3 in health, a 4 in flammability, and a 0 reactivity.

The primary hazard of carbon monoxide gas is that of an asphyxiant with relatively low levels producing adverse health effects. These effects can range from mild headache after two hours of exposure to 200 parts per million (PPM) to unconsciousness after 30 minutes exposure to 1600 PPM. OSHA has set a level of no more than 35 PPM as an allowable workplace standard for an 8-hour day, and the EPA has established that residential levels should not exceed 9 PPM over an 8-hour average.

Symptoms from exposure to lower level concentrations include headache, nausea, dizziness, weakness, difficulty breathing, and other flu-like problems. Exposure to high levels will cause cyanosis, hallucinations, angina, and unconsciousness. Any patients suspected of having CO poisoning shall be moved to a fresh environment, placed on high flow O_2 and transported to the closest medical facility.

Residential CO problems can normally be traced to problems that include, but are not limited to, the use of gas furnaces, gas dryers, gas stoves, fireplaces, kerosene heaters, bar-b-que's, or vehicle that are running in or near the structure. Indications of incomplete combustion from gas burning appliances include yellow flame, soot build-up on roof vents, and soot build-up on interior walls. All possible sources shall be checked, and certified repair technicians shall be called as necessary. Southwest Gas shall be notified if any signs or symptoms of CO poisoning are exhibited.

Industrial CO problems can be associated with large furnace type operations, large scale equipment that utilize combustion type engines, or leaks from cylinders that contain compressed carbon monoxide gas. Any operation of an internal combustion engine in a confined space without adequate ventilation will create a highly dangerous and life-threatening environment.

Residential CO detectors are available and will sound two types of alerts. The first is a warning chirp that notifies there is a developing or chronic CO problem that will produce a 4-7% carbon monoxide in blood hemoglobin level over time. In the event of a warning signal, the residence should be ventilated, the test button should be pushed, and all possible sources of CO shall be checked and adjusted or repaired. The warning level is set at 60 PPM CO for greater than 66 minutes. The second alert is a full alarm that warns of levels that will produce 8-10% carbon monoxide in blood hemoglobin levels. The detector will alarm at these three points: 100 PPM will trigger an alarm within 90 minutes, 200 PPM will trigger an alarm within

35 minutes; and 400 PPM within 15 minutes.

A full alarm indicates that dangerous levels of CO have been reached and that immediate action should be taken. These actions include evacuation, ventilation, investigation, and denying access until the source of the CO is secured.

Additionally, the increased use of CO detectors has resulted in many local responders (fire, police, and EMS) being burdened with numerous calls but without a clear and definitive standard operating procedure (SOP) and proper training. Many published SOPs conflict with each other. It is reported by American Medical Association (AMA) that CO is responsible for 800 to 1,000 deaths per year and some 10,000 people seek medical attention.

Challenges for Public Sector Responder Training

Most current Awareness and Operations level training programs do not address this issue sufficiently. Provider of hazardous materials response training should enhance training for the first responder at the awareness and operations levels with material and competency instruction on the following topics:

- CO hazards and toxicity
- Limitations of home detectors
- Limitations of responder carried monitoring devices
- CO recognition and identification, including signs and symptoms of CO poisoning;
- Proper entry procedures and techniques,
- Evacuation, ventilation and source investigation procedures
- CO source control and management
- Post incident action and follow-ups.

Training should also be supported by appropriate standard operating guidelines for first responder A sample of an SOP is provided below.

All CO detector alarms shall be addressed as an emergency until no hazard has been identified. Steps taken shall include, but are not limited to:

- *Verify detector is CO type*
- *Check for CO related symptoms and evacuate structure as necessary*
- *Check power supply to detector*
- *Assess scene for CO sources*
- *Determine need for additional resources: Haz mat or other units for CO meters, utility company, police department, etc.*
- *Utility company shall be notified if any signs or symptoms are present.*

CLANDESTINE DRUG LAB OPERATIONS

During routine emergency responses to fires or other emergencies it is possible that responders will discover the presence of a clandestine drub laboratory. Clandestine drub laboratories by their nature are disguised and are often encountered accidentally in a great variety of situations, including warehouses, store fronts, apartment buildings, single family dwellings, rural outbuildings and even truck trailer accidents. It should be generally understood that response to a clandestine drug laboratory is a hazardous materials incident. These types of incidents may expose you to toxic, flammable, explosive, and corrosive atmospheres. Without proper training, your health and safety are at risk.

Proper personal protective equipment at a clandestine drub lab incident is absolutely critical for avoiding exposure. Structural fire fighting or EMS gear offers little, if any, protection in such situations. In order to be able to recognize when you are inadequately protected, you must be aware of the limitations of your clothing and SCBA. You must understand that clothing which is adequate in one situation may be inadequate or even dangerous in another. No one protective clothing system will protect you from all situations.

In any emergency situation involving clandestine drub labs there is a risk of exposure to toxins; those materials that are capable of causing injury or death when absorbed. Through an understanding of the types of toxins, their effects, the various routes of entry, and specific biological hazards, emergency response agencies can take more appropriate actions to ensure their own health and safety during clandestine drug laboratory operations. In addition, it should be noted that effective clandestine drug lab incident response requires a well-functioning Incident Management System (IMS). Operating without an IMS or without a complete understanding of how an IMS works is inefficient and dangerous to all agencies involved. Listed in the guidelines are the current OSHA and NFPA laws and standards that apply to emergency response agencies who respond to hazardous materials incidents. Below is a discussion of the application of those hazardous materials competencies to the special hazardous materials response challenges posed by clandestine drug lab operations.

Learning Objectives

The following learning objectives *should be the minimum in any* Clan Lab Course. Upon completion of the course, participants will be able to:

- Discuss terminology associated with drug labs (glossary).
- Discuss history of clan labs.
- Demonstrate, through chemical reaction and/or video format, the possible catastrophic results of chemical interactions and reactions.
- Be familiar with the hazards associated with drug lab operations.
- Be familiar with some chemicals found at a drug lab operation.
- Explain the need for a personal protective equipment program for fire, police, and EMS personnel.
- Explain the routes of exposure and toxicological effects of short term exposures (acute) to these precursor chemicals and the possible long term (chronic) effects of clan lab chemicals on the human body.
- Discuss the federal laws and national standards associated with the use of PPE and chemical response programs.
- List common locations of clan lab operations.
- Explain the needs for well-established standard operating procedures within the fire department and between other agencies.
- Describe, through generic standard operating procedures, the operational goals and objectives for each of the following organizations:
  - Fire Department (First Responder)
  - Fire Department HMRT (Hazardous Materials Response Team)
  - Local Police
  - EMS

- Speak to the issue of responsibility for clean-up and termination of a clan lab incident.
- Explain the importance of scene management at a clan lab incident.
- List the common components of an Incident Management System.
- Overview decontamination procedures.
- Overview termination procedures.
- Explain why post-incident analysis and evaluation are necessary elements of scene management.

Competencies

The student will be able to:

- Name at least three general hazards associated with drug lab operations.
- Select from a list of chemicals those most commonly found in drug lab operations.
- Name two catastrophic results of chemical interactions at drug lab operations.
- Describe his/her standard operating procedures for dealing with drug lab operations and name the contact personnel from at least one law enforcement agency that they would most likely deal with.
- Describe at least two key elements of a PPE program.
- Explain the biological side effects of exposures to precursor chemicals used in illicit drug labs and express the possible acute and chronic effects of exposures to these chemical environments.
- Generally describe the overall operational goal and objectives of the following organizations:
  - Fire Department (First Responder)
  - Fire Department HMRT Units
  - Local Police Department
  - EMS
- Describe the need for establishing clean-up and termination responsibilities.

STIMULANTS

Stimulants are compounds which affect the central nervous system by accelerating its activities. Stimulants are either natural or synthetic. An example of a synthetic would be methamphetamine and a natural stimulant example would be adrenaline.

A. Natural

The first natural stimulant discovered was epinephrine (adrenaline), a substance found in adrenal glands of animals. Its effects were first discovered in 1899.

B. Synthetic

In 1919, a Japanese chemist developed the first synthetic stimulant, methlamphelaime. In 1927, a substance called 1-phenyl 2-aminopropane and its action were first described leading to the further research and development of benzedrine and dexedrine (common drugs used during the late sixties and early seventies for weight control).

CLANDESTINE DRUG LABS

The following general information is based on Drug Enforcement Agency (DEA) Special Agent Patrick Gregory's testimony before the California Select Committee on Drug and Alcohol Abuse on November 15, 1985.

On a national average, one of five (or twenty percent) of all clandestine laboratories result in, and/or are discovered through, fires and/or explosives. During 70 clandestine laboratory investigations, ten percent involved agents being confronted by suspects who had fully automatic and silenced weapons and some form of booby traps or explosive devices. In thirty percent of the cases, defendants were using electronic counter-measures, ranging from scanners to sophisticated video monitors to sound sensing devices.

During the course of these investigations, thirteen firefighters and four police officers required medical treatment as a result of exposure to hazardous chemicals and chemical wastes. Minor injuries resulted from exposure to hazardous chemicals and chemical wastes. Because of exposure to caustic, corrosive, carcinogenic, irritating, explosive, and flammable substances encountered at lab sites, every agent has suffered minor injuries including burns, rashes, headaches, light headedness, and nausea.

The first lab seized in California was in 1963 (amphetamine) in Santa Cruz.

1984 - 93 labs seized in California
1985 - 215 labs seized in California
1986 - 325 labs seized in California
Of the 325 labs seized in California, 293 were Methamphetamine. Of those 293 labs, 82.5% were using Ephedrine as the primary chemical.
1986 - 509 labs seized nationwide
1987 - 489 labs seized in California
1987 - 682 labs seized in the United States
1988 - Approximately 1,200 laboratories were seized by law enforcement agencies, federal, state, and local police nationwide.

Clandestine Drug Laboratories remain the principle source for methamphetamine. States where most clandestine laboratories appear to be operating are:

- Southern and Northern California
- Eastern Texas
- Oregon and Washington
- New Mexico
- Florida
- Pennsylvania
- New Jersey

TYPES OF LABS AND HAZARDS

A. Extraction Labs

This is where raw plant material is changed into a finished drug by the use of chemical solvents and/or acids. The chemical structure of the drug is not altered. Some examples of this are marijuana to hashish, opium to morphine.

Also under this title are indoor or underground confined space marijuana grow farms. Marijuana grow farms have a high rate of booby trap. They grow marijuana in confined space grows so that they can reduce the oxygen levels in the grow area, making the plant produce more sap, which means more tetrahydrocannabinol (THC). This is accomplished by flooding the confined area with either carbon dioxide or propane. Both gases will displace the available oxygen, and, in the case of propane, produce a possible flammable and explosive atmosphere. Without instrumentation, the firefighter has no way of evaluating the hazard, which is O_2 deficient and possibly flammable. If faced with a rescue, these confined spaces should be approached according to OSHA's proposed Confined Space Protocol 29 CFR 1910.146.

B. Conversion Labs

Currently thought to be the most prevalent. In these labs, a raw or unfinished drug product is changed into a finished or refined drug. Here the chemical structure is changed. Examples of this are cocaine base to cocaine hydrochloride (the white powder sold on the streets as cocaine), and cocaine hydrochloride to cocaine sulfate (aka crack or rock cocaine). Numerous flammable liquids, corrosives, acids, and bases, as well as oxidizing agents, are found at these sites.

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Realistic Approaches to Rural and Frontier Hazardous Materials Risk Management

Introduction

Hazardous materials risk management had early origins as an outgrowth of concern over protection of the public from major disasters and emergencies. Because of need, the natural evolution over time has been to expand the national focus from large, infrequently occurring fixed-facility disasters in heavily populated areas to the more realistic threats of smaller, more commonly occuring transportation and small fixed-facility incidents that are ever-present throughout the nation.

However, many of the principles and concepts of hazardous materials risk management today retain critical presumptions of levels of available resources that are true for large industries and large, well funded communities, but are unfortunately not true for most of the smaller communities nationally. This is a growing national challenge that needs to be addressed. Small jurisdictions, especially rural and frontier communities, do not have the tax base, financial resources or personnel needed to manage their hazardous materials risks in the same manner as larger, more affluent urban and suburban jurisdictions.

Rural and frontier communities nonetheless often have considerable hazardous materials risks that must be addressed, in spite of the limited resources to do so. Transportation accidents, for example, occur along routes that cross rural and frontier jurisdictions with no less frequency (and by some measures with considerably greater frequency) than they cross urban or suburban areas.

What is needed is an alternative approach to hazardous materials risk management that will address these risks while at the same time accommodating the limited resources and other unique parameters and capabilities of rural and frontier communities. The following concepts and strategies are offered to support such an alternative approach, and address an introduction to the unique character of rural and frontier communities as well as proposing realistic strategies for managing hazardous materials risks in these environments. The strategies proposed are drawn from the successful practices of a number of rural and frontier jurisdictions who have undertaken to develop their own unique methodologies for preparing for and responding to hazardous materials emergencies.

The Social Cost of Space

As Americans, we honor space. Even those Americans who live in metropolitan, urban and suburban areas love to speak of wide open spaces and annually vacation in America's hinterland to camp, fish, hunt and hike. However, residents who live permanently in the extremely rural and frontier areas of America often must pay a price for the experience. Sociologists and anthropologists call this price the "social cost of space". This cost is measured in terms of services, accessibility, standard of living, social events and other necessities, which are significantly less available in rural areas than in metropolitan areas.[1]

The underpinnings of the social cost of space are manifest to any visitor to a small town with diminished industry, population, commerce or tax bases. From an emergency preparedness perspective, this cost is reflected in a significant reduction of the services, skilled technicians, bureaucratic organizations, and technological systems necessary to maintain the high level emergency services "standards of care" that urban centers enjoy.

[1] See: A.H. Anderson, "Space as a Social Cost," *Journal of Farm Economics,* Volume 32, No. 3, 1950; and Carl Kraenzel, "Sutland and Yonland Setting for Community Organization in the Great Plains," *Rural Sociology,* Vol. 18 (1953), pp. 344-58.

This social cost of space is also reflected in important cultural differences in local management systems, techniques and terminology. These cultural differences drive the style and programs of emergency management and preparedness in rural and frontier communities. The diminished resources and limited time available force all participants to attend only to high priority issues of immediate and very real impact, and there is little tolerance or support for external mandates or requirements that are not seen as having an immediate local importance or impact. To be effective, all local emergency management programs, initiatives, and actions must pass the test of immediate actual relevance to current local affairs or problems before they will be undertaken in rural and frontier communities.

This social cost of space determines the realities of what can and cannot be done in hazardous materials risk management in rural and frontier communities. These realistic limitations give rise to a number of complex questions and issues that need to be addressed, such as the viability of alternative standards of care, alternative levels of acceptable risk, and alternative, more streamlined procedures for hazardous materials risk management and control.

Rural and Frontier Communities: Government Concepts, Definitions and Programs

There are many different definitions used to describe and discriminate between frontier, rural and urban areas. These definitions are used for different reasons by different programs, different federal and state agencies, and different disciplines, and there is no single criteria in use nationally with which everyone agrees. For example, “frontier” and “extremely rural” are defined by population density of ten or fewer persons per square mile by the U.S. Department of Health and Human Services (DHHS), for standards of care analysis purposes. By contrast, the U.S. Bureau of the Census, for the purposes of statistical census analysis, defines “urban” as comprising all territory, population, and housing in areas and places of 2,500 people or more, and defines “rural” as everything else. There are also many definitions in use that depend upon factors other than population size and density, including measures of proximity to and relationship with urban areas, measures of the degree of urbanization, and geographical area classifications by principle economic activity.

Regardless of the definitions used, it is generally understood that there are important differences in the economic, public services, and personal lifestyle characteristics of rural and frontier areas. In addition to having a smaller economic base than urban areas, rural and frontier areas also receive less external financial and services support from federal sources, which accentuates the gap between rural and frontier resource bases and those of urban areas. Because of population served, urban and metropolitan areas have historically been the primary targets of federal programs and activities, including dialogue and input regarding national standards of care and standards regarding affordable minimum levels of service. So rural and frontier areas are often held to unobtainable standards of care requirements that are affordable only with urban-level resources and services.

However, there is a growing understanding of the need to address this challenge nationally. The DHHS and the U.S. Congress have taken the lead in developing the concept of “frontier” status and promoting the need for a separate but adequate standard of care for extremely rural areas.[2] Many state governments and agencies with extensive rural and frontier areas within their jurisdiction have also been attempting to address these issues. For example, the Montana Disaster and Emergency Services has adopted the frontier designation as defined by the DDHS in an attempt to emphasize the extremely rural nature of most of its counties. To be eligible for DDHS Bureau of Health Care Delivery and Assistance support as a frontier area, the following service area criteria must be met:

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[2] U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Bureau of Health Care and Deliver Assistance, “Primary Care Activities in Frontier Areas - Regional Program Guidance Memorandum 86-10,” unpublished memorandum, Rockville, MD June 10, 1986; Laura Summer, “*Limited Access: Health Care for the Rural Poor,”* Center on Budget and Policy Priorities, Washington, D.C., March, 1991; and Congress of the United States, Office of Technology Assessment, Rural Health Care, “*Defining ‘Rural’ Areas: Impact on Health Care Policy and Research,”* July, 1989.

Service Area: a rational area in the frontier will have at least 500 residents within a 25-mile radius of the health services delivery site or within the rationally established trade area. Most areas will have between 500 and 3,000 residents and cover large geographic areas.

Population Density: the service area will have six or fewer persons per square mile.

Distance: the service area will be such that the distance from a primary care delivery site within the service area tot he next level of care will be more than 45 miles and/or the average travel time more than 60 minutes. When defining the "next level of care" we are referring to a facility with a 24-hour emergency care, with 24-hour capability to handle an emergency caesarian section or a patient have a heart attack and some specialty mix to include at a minimum, obstetric, pediatric, internal medicine and anesthesia services.[3]

How Much of the United States is frontier and rural, and what is the significance to hazardous materials transportation?

The map delineating frontier areas by county shows that about one third of the geographical area of the U.S. can be categorized as frontier.[4] The map showing non-metropolitan areas and percent rural population suggest that, in addition, well over another third of the U.S. is rural.[5] The combination of these two areas suggest that close to three fourths of the geographical area of the U.S. is frontier and rural.

Although by definition these areas serve a only a minority of the population of the U.S., the fact that most of the U.S. is frontier or rural is of key significance to hazardous materials transportation. It is extremely important to note that, from a hazardous materials risk management perspective, **the majority of all hazardous materials transportation routes lie in rural and frontier jurisdictions**.

It is recognized that past commodity flow studies and other risk assessments have indicated that risk of accident in concentrated urban areas is greater, especially those with a preponderance of fixed facility hazards, and that, by definition, the risks to the population are greater in urban areas. So there has been good justification nationally for past priorities to focus hazardous materials risk management on these threats. However, it must also recognized that rural and frontier areas today present a major un-met national transportation risk and challenge, and that this challenge is greatly accentuated by the diminished resources and lack of infrastructure in rural and frontier communities to support appropriate hazardous materials planning and response.

The Effects of Low Population on Rural and Frontier Response Organizations

In order to develop more effective strategies for rural and frontier hazardous materials risk management, it is critical to first understand the characteristics of local emergency management and response. A typical rural town has a mix of governmental and quasi-governmental groups, including those functional areas related to emergency and hazardous materials response: fire, law enforcement, emergency medical services, public works, public health, emergency management and elected public officials.

Fire: VFD, or Volunteer Fire Department, is the typical fire organization. There might be other types of districts, other names, other acronyms, but what exists, basically, is a group of individuals who volunteer their time to provide the community's fire protection services. They train, on their own time, they fight fires on their own time, and they volunteer time to fund-raising, which is often the only financial support for the response organization. Occasionally there may be a paid Chief, sometimes there are a few paid fire fighters along with lots of volunteers, but the heart of rural and frontier fire-fighting efforts is the volunteer sector, and it is structural.

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[3] DHHS, "*Primary Care ...."*

[4] See Figures 1, map from DHHS, "*Defining Rural Areas . . . "* on frontier counties in the U.S.

[5] See Figures 2, 3 and 4, maps from DHHS, "*Defining Rural Areas . . . "* on metropolitan and urban population sites, with the remainder being rural and frontier areas.

In tandem with the volunteer structural department there may be a wildland/forestry fire crew and often a county road crew, that fights wildland fires. These crews typically can assist in domestic fire-fighting only in limited support roles. Occasionally, depending upon the geographic location, there may be a nearby military fire fighting contingent or an industrial fire brigade that can lend a hand, but with few bases or industries, these are rare.

This is the frontier fire fighting reality, minimally equipped and trained volunteers, often using hand-me-downs from regional paid departments, who are paged, leave their place of employment, drive to the fire house, take the truck with equipment to the scene, and fight what's left of the fire.

Law Enforcement: Typically, organization consists of very small police departments with small jurisdictional areas, typically within the city limits. These departments work in conjunction with sheriff's offices with large jurisdictions and insufficient staffing. Within the large geographic area of frontier counties, the officer-per-square-mile is minuscule. Given the fact the average population is less than six persons per square mile, many western areas must count on cross deputizing and mutual aid with local game wardens, highway patrol officers and tribal police to supplement local jurisdiction law enforcement officers.

Emergency Medical Services: There is a wide variety of EMS providers in extremely rural areas (volunteer, clinic, private, fire, etc.), but they all suffer from the same problems: lack of money, lack of technicians, lack of equipment and lack of volunteers. Some "hospital runs" can cost a volunteer a whole day's work. Tourists can overload systems set up for locals, drying up the volunteer base. Higher and more complex competencies make training requirements unmanageable on a volunteer basis.

Public Health: While EPA office personnel may be very familiar with acronyms like RCRA, EPCRA, CERCLA, CAA, CWA, OPA and even OSHA, it is more likely that a rural or frontier county sanitarian or code enforcement officer will be familiar with spending the day inspecting septic tanks and restaurants rather than going through hazardous materials or hazardous waste regulations. Some rural and frontier counties do not have permanent sanitarians. Many counties share sanitarians, some hire them on an as-needed basis. With their overwhelming workload and local customer focus, they have little time for, what from their perspective would seem to be, intrusive and unfunded federal mandates.

Public Works: Public works personnel should be welcomed players at emergency incidents. They are used to working outside, on streets, roads and highways. They have emergency equipment, barricades, etc. Unfortunately, while a county or state may have a great deal of equipment and operators, it is spread out. The result is that very little equipment and personnel are available locally in a small town.

Emergency Management: Emergency management is a low priority in a rural and frontier city or county government. The majority of local emergency managers are part time. Most have many other duties, with other duties being known to include safety officer, coroner, junk vehicle officer and floodplain manager. The number of management courses needed to make a good emergency manager from scratch would use up all of a part timer's hours for two years. Yet, the position is critical to emergency management and hazardous materials risk management activities in rural areas.[6] It might even be said that without an effective local emergency manager, the odds are extremely low for having a good hazardous materials or emergency management program.

Elected Public Officials: County commissioners, mayors and even sheriffs are high among the leadership of local communities. They usually are ranchers, farmers, businessmen, miners, loggers, etc. They are workers, not managers. They have the final say regarding many activities of governmental and quasi-governmental activities, yet they often have little experience to prepare them for their regular governmental duties, and usually lack the qualifications necessary to delve into disasters and hazardous materials emergencies.

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[6] See Frederick J. Cowie, Ph.D., *Hazardous Materials Risk Management in Extremely Rural Areas,* 1993.

Toward Realistic Approaches to Rural and Frontier Hazardous Materials Risk Management

Federal programs, such as EPCRA and other SERC-LEPC initiatives, presume the existence of local emergency planning committees (LEPCs). This theory presupposes the existence of an industrial tax base, paid responders, training on company time, adequate equipment and a variety of other luxuries.

Frontier facts are simple. There are probably no or few paid responders, outdated or nonexistent equipment, no tax base, no time to train and no active local emergency planning committee. The amount of time, effort, and money requisite to produce a trained, equipped, planned and exercised response community is beyond the scope of most rural and frontier communities.

The EPA has funded at least one project designed to address the problems of frontier LEPCs[7], but there are still extensive challenges stemming from the fact that most frontier LEPCs exist only on paper, if even there. The EPA has had some success in creating coordinated hazardous materials response and risk management where none existed, yet this success is geographically intermittent. Much has been done, but the vast majority of the work lies ahead. In rural and frontier areas, the chances of a truck carrying hazardous materials having an accidental release within the jurisdiction of an active LEPC or within the jurisdiction of a local hazmat team are extremely poor.

Some frontier and rural states have programs and projects designed to develop active frontier LEPCs, but these programs tax the perseverance and creative skills of personnel, because of insufficient staff, time, and resources. The work that needs to be done, needs to be done effectively, efficiently and with a minimum of wasted effort and duplicated efforts.

Some approaches work better than others, some approaches have proven successes, some approaches are worth using while others can stifle any embryonic LEPC development. The following techniques and suggestions drawn from successful practices in rural frontier environments, are presented as possible alternative strategies for rural and frontier hazardous materials training and program management.

Sample Recommended Practices:
An Alternative Approach to Hazardous Materials Risk Management Training in Rural and Frontier Areas

1. Start with Baseline Chemicals, Hometown Chemicals

The greatest challenge in developing a hazardous materials program with volunteers in rural and frontier communities is to make it relevant. Volunteers will not give up an evening, a weekend or a minute to hear about make-believe scenarios or federal mandates. Success, to date, in small towns with volunteers has been by the use of next-door chemicals. Failure has been catastrophic when the emphasis has been on catastrophic events and trainloads of extremely hazardous substances. The fight can't be won with theory, it can be won with facts.

Using a flip chart[8], a skilled facilitator can draw out of the local group the list of chemicals in their town that can hurt them, their kids, their parents, their friends. It does not matter what the list ends up being, because it will be real and it will be a starting place they can relate to and live with, since they do everyday! The baseline chemical list will look something like this:

- gasoline
- diesel
- LPG/propane
- acids/bases
- natural gas
- chlorine
- pesticides/poisons
- explosives

[7] Frederick J. Cowie, Ph.D., *Developing Realistic LEPCs in Extremely Rural (Frontier) Areas*, 1994.

[8] Use technology comparable with that available locally to your audience. Flip chart is comparable to the clip board you will find in small towns. No fancy computer programs, please!

- crude oil
- anhydrous ammonia
- paints/solvents
- household chemicals

This list should be, will be, real to local fire fighters, local responders, local industrial folks. These are everyday chemicals in everyday towns. Luckily for trainers and planners, unluckily for citizens and responders, these pretty well cover the gamut of hazard classes, at least well enough to develop a baseline set of hazards. It is good to point out at this point that we are a chemical-based society, that chemicals are the reason our society is as it is. That is not to say it is good or bad, right or wrong, but that is just how it is. Chemicals are on the roads and rails, because they are destined for facilities in our towns that need them. These are the transportation industries and fixed facilities that hire our friends and neighbors, that support our communities, that make America work. The chemicals are the chemicals of modern life, even in frontier America. Let's look at them:

Gasoline: It's everywhere; flammable liquid; fairly low flash point; kills a lot of people; causes a lot of property damage; comes in large quantities; has recognizable industry names; corner filling stations. Frequent large releases, often to do with highway traffic accidents, or smaller releases due to overfills at delivery sites.

Diesel: It's everywhere; fairly high flash point; large number of small releases due to saddle tanks on trucks involved in traffic accidents.

LPG/Propane: It's the heating fuel of choice in rural, camping and barbecuing America; comes in varying sized containers; distribution sites in or near all small towns; infamous from Kingman, Arizona; associated with BLEVEs; a lot of it on the road; a liquefied-gas, looking for space, air.

Acids/Bases: Lots of acids used in refining and manufacturing; corrosives; eat their way to a more neutral pH; comes in large and small quantities; lot of it on the Interstates.

Natural Gas: Rarely on lists; explodes, burns, asphyxiates; infrastructure often old; releases often caused by backhoes; gathering lines and pipeline facilities.

Chlorine: A killer; basic manufacturing chemical; basic water purification chemical; large and small cylinders; lots of rail cars; municipal swimming pools.

Pesticides/Poisons: Including herbicides, fungicides, etc.; on seed wheat and potatoes, etc.; lots of it on roads at certain times of year; designed to kill; store in co-ops in or near all small towns.

Explosives: Unexploded military ordnance; old nitroglycerine and dynamite; high school chemistry labs; terrorist activities.

Crude Oil: Large quantities; production-area specific; environmentally nasty; very high flash point.

Anhydrous Ammonia: No water content, therefore hydrotropic (water-seeking); corrosive; inhalation hazard; distribution sites in or near all small towns; nurse tanks pulled by pickups.

Paints/Solvents: Everywhere; hardware stores and car parts stores; dry cleaning and automotive; many carcinogenic; flammable liquids.

Household Chemicals: Cleaning products; drain cleaners; charcoal starter; paint thinner; old stuff nobody knows what it is any more, and so on.

It should always be remembered that there rarely are either historical or zoned areas for chemicals in small towns. Hazardous materials distribution points are often in close proximity to residential areas, schools, retirement homes and medical facilities, often downwind in the pathway of prevailing winds. Once the frontier community firmly believes that there are hazardous materials next door, next door to their kids and spouses and parents and friends, then they can be moved to the next step, human pathways for chemicals, good and bad.

Pathway examination is critical to elevating the consciousness of small communities about hazardous materials. It humanizes and personalizes what is otherwise a technical nightmare. Humans intake air or food or liquids in four ways, and they intake hazardous materials in these same four ways, hazardous materials that can maim or kill them. If the emphasis is placed on the humans, the citizens, the responders, the industry employees, there is a much better chance at success, a much higher acceptance ration, than if the left-brain, technical side is overemphasized. [Technically-oriented trainers tend to over-chemicalize hazardous materials incidents, thus the following pathways section may be given first to humanize hazardous materials incidents.]

2. Entrance to the Human Body: Four Pathways

It is critical to emphasize in every way that they, the responders, citizens, industry employees, are the most important things: not chemicals, not management systems, governments, structures or highways. Emphasize that the way their body takes in food, water, oxygen, etc. is going to be the exact same way it takes in carbon monoxide, poison, etc. Prove to them that they have to understand themselves in order to stay safe. Discuss the four pathways, parallel them to environmental area for further emphasis. Show the environmental as a secondary safety problem, long term safety problem, yet a safety problem indeed. **Safety first, and it's their safety!**

1. Inhalation: Breathing, in and out. Have them actually do it forcefully. Explain to them that this is a pathway and that does not differentiate the kind of hazard in that pathway. It could be a corrosive, a poison, an asphyxiant. The results would be different, all bad. Remind them that their body will breath, in and out, automatically. They can't stop the pathway. Environmentally, contrast clean air with air pollution.

2. Absorption: Something on the skin, slowly moving through the skin, past the muscles and into the blood stream. Again, it could be different hazards using the same pathway. Environmentally, this can be compared with percolation through the soil into the aquifer.

3. Ingestion: Eating or drinking is the usual idea. But people don't usually eat or drink hazardous materials straight, but they could be swallowing contaminated saliva. Children could be playing on contaminated dirt. All swallowed material goes into the digestive tract. Environmentally similar to dumping something directly into the stream or river.

4. Injection: Needle injection often comes up, but at incidents it is usually either done via new or old cuts, abrasions, punctures, etc. This speeds up, through a more direct pathway, the entrance into the blood stream. Environmentally similar to a release near a wellhead that siphons material directly into the aquifer.

This creates a good teaching paradigm necessary for good training: Participants identify **both with** their own personal human body functions **and with** the chemicals which exist next door to them, their loved ones and their friends.

3. Personal Protective Equipment (PPE) in Frontier Areas

A person's past history, experiences, and training are far more important in changing behavior at hazardous materials incidents than is new data. Therefore, a trainer or facilitator, in order to be effective and change behavior, must address the standard incident comfort level of the responders, especially in rural and frontier areas. The local responders are not professional data managers used to manipulating abstract concepts. Deal with them where they are. Ask them for examples of personal protective equipment (PPE) they have and what it protects them against. A list might contain some or all of the following. Law enforcement: vests/bullets; latex gloves/blood borne pathogens. Fire: Bunker gear/some heat and flames; SCBA/airborne hazards. EMS: latex gloves/blood borne pathogens; goggles/blood borne pathogens, projectiles. Public works: leather gloves/scrapes, cuts. Public health: latex gloves. Emergency managers: Hard hats/things that hurt their heads.

Once they are comfortable explaining their PPE (they may have never used this phrase or acronym before), ask them to review the baseline chemicals and the four pathways. Then lead a discussion of PPE for hazardous materials incidents. Let the group come to the conclusion that they virtually have no protection against chemicals, except the firefighters and their SCBA in relation to inhalation hazards. What about simultaneous inhalation and absorption hazards or corrosives? Is the bunker gear really helpful at a hazardous materials incident? Are there false senses of security and protection?

Provide them with an understanding of the four levels, A-B-C-D of PPE according to EPA and OSHA. Have them discuss where they personally fit on the A-D scale, which for the most part is the "street clothes" level. Then gently advise them that their PPE is **distance**, pure and simple. Distance moves their own, individual four pathways away from the chemical processes involved in the incident. They can understand this. They may want to do something. They may want "hands on." But what they need is to be safe.

*4. North American Emergency Response Guide (NAERG) **in Frontier Areas***

With regards to safety, the most important document in hazardous materials response in rural and frontier jurisdictions is the NAERG. It is an accepted national standard of care. It is that standard against which incident response will most likely be measured by post-incident authorities. It is universally available, it can be adopted and should be adopted as the transportation incident response plan by jurisdictions, volunteer and paid fire departments, law enforcement, EMS, public health, public works and emergency managers, in lieu of oral or non-existent plans. Yet, it is not often marketed well. However, if it is introduced to the response and planning community here, after the baseline chemicals, four pathways and PPE/distance, then it is accepted as a **necessary and appropriate** guide to initial response, hands down.

Why? Because the appropriate question, after distance is described as personal PPE in frontier areas, is "What Distance?" The answer for NAERG chemicals is in the Guides. Safe distance is the hook to get their interest, then one can do NAERG training. Once they understand how to determine the **isolation** radius, how far to get people out and how far to keep new people away, then they can proceed to other parts of the Guides: Potential Hazards, Protective Clothing, Fire, Spill or Leak, First Aid, etc. This is a user-friendly, foolproof system. They can be shown the green pages with their isolation and protective action distances and water-reactive tables and the white pages with the data management ideas and narrative sections. But if they don't see how this is important to them personally, individually, then they will not use it. And the way to get them to use it is to get them to buy into **personal safety first, then public safety!**

5. Don't try to sell ICS (Incident Command System): Use tabletop exercises with realistic scenarios to develop locally-intelligible incident management from the chaotic ground up.

The resistance to management training in general, and ICS training in particular, in rural and frontier areas is legendary and well-founded. Many governmental, managerial and developmental ads have come and gone. Time-restricted local responders don't want another three-letter acronym to put in the trash with MOB, TQM and MBA. In rural areas, any medium-sized to large incident, especially highway incidents, demands the use of a management system. Let the incident scenario demand management help, it can do it by itself. Use the five basic operational response areas: fire, law enforcement, EMS, public health, public works.

It has been found that in rural and frontier areas, everything is done with neighbors, mutual aid and outside help. There are just not enough locals to go around. The fire lead may be the local VFD, but there usually are two or three mutual aid VFDs involved, plus a county wildland fire crew and maybe one from state forestry. The law enforcement lead may be the county sheriff's office, but they need help from city police, state highway patrol, game wardens, and in the west, tribal police, FBI and ATF. Public works lead may be either county roads or state highways, but each needs the other and sometimes city street crews' help. One county public health nurse or sanitarian can't handle a big incident, so city or state folks are called in. In addition, local, county and state emergency managers, public officials and industry personnel may be needed.

Let this group of fifteen or twenty agencies, which are necessary to handle a not-uncommon incident, demand a management system and the responders will beg for help. When someone comes to help, don't let them bring tomes of professional looking ICS/NIIMS documents. All a frontier or rural responder or manager needs is the basic concepts: Span of control and a logical differentiation of roles. Roles: Incident Commander (or Unified/Joint Command); Commander support (Liaison, Safety, Public Information); Operational Support (Logistics, Planning, Finance) and Operations (Fire, Law enforcement, EMS, Public Works, Public Health, Other).

Demonstrate that the Incident Commander and the Operations Chief need to be managers, perhaps with an operational specialty, but the emphasis has to be on management skills and not specific operational expertise. Explain the need for perspective, reflection, data management, analysis of the situation. Differentiate decision making from implementation of the decision. Show the need to group functional response agencies (Fire, Law enforcement, EMS, Public Works, Public Health, Other) and that each group needs a control, a lead person.

Once they can see this, then they will become interested in training to ICS, the national standard for incident management. Until they see the need by walking through incident scenarios, however, ICS trainers are wasting time in frontier America.[9]

6. Marketing CHEMTREC, CHEM-TEL, MSDSs and Information Management in Frontier Areas

Once the participants realize the incident scenario might or will involve technical personnel beyond the local responders' defensive operations level, whether they are hazmat team members, emergency room nurses and doctors, or public health nurses or technicians, local responders will see the need for information above and beyond that which NAERG can provide. That is when the trainer or facilitator shows them in the NAERG how to access CHEMTREC and/or CHEM-TEL to get the MSDSs and the manufacturer data needed to learn the chemical specifics often necessary for technical response. Do not get bogged down here in EPA or OSHA regulations, just use a real MSDS from one of the baseline chemicals, like anhydrous ammonia, chlorine or LPG. Keep up the momentum of the training, don't kill it with regulatory confusion.

This is also a good time, since the subject is data management, to discuss data collection and data management. Show them that all incidents require responders and participants to know certain information in order to handle situations properly: exact location, chemical name, container, amount originally in container, amount released, release rate, weather, temperature, wind, responsible party names and numbers, insurance company names and numbers, etc. The group of participants, from the participating agencies and all affected groups, should develop a jurisdictionally-correct checklist. The NAERG pages 2 and 3 are a good start, but the hazmat team or the clerk and recorder might want different or subsequent information. Put their needs into the system early on.

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[9] Frederick J. Cowie, Ph.D., *A Visioning Approach to Exercise Design in Extremely Rural (Frontier) Areas,* 1997.

7. Getting Past Negativity with Frontier Audiences

As a trainer from Idaho once said, what they say is "Ain't got no LEPC! Don't want no LEPC!" Starting from scratch is the hardest thing to do and nothing succeeds like success. These two truisms may seem contradictory, but they are reality on the frontier and in rural areas. The key to success is targeting. No one can bring all jurisdictions up to speed at the same time. That approach beckons disaster. Target efforts to one local jurisdiction, county or small town, where there is one person in some important role (fire, law enforcement, EMS, public health, public works) who can act as a local catalyst. This person should be willing to dedicate work over the next three to five years, because that is what it takes to develop a local emergency hazardous materials response system. Then commit yourself to make trips to that jurisdiction every month for the next year.

Start with two or three awareness courses (using the principles outlined above). Then do a series of successive tabletop exercises, the first one being an orientation, working through the need for a management system (as outlined above). At that first orientation meeting, use a simple oral or one-page hazard analysis system, where the locals decide what are most likely, most locally interesting, most locally important scenarios.[10] Plan to do three or four tabletops, making them sequentially more complex. Never make them more deadly or more complex or more intense than needed to give the local responders **practice** (that's what exercises should be in rural areas, practices, not tests) doing what they are currently equipped and trained to do. Do not go overboard, don't kill everyone, don't plan to fail!

The evolution of frontier exercises has led to the development of a two-hour exercise where four-to-six different scenarios, using baseline chemicals and relevant local data, are given to local teams, consecutively, one every twenty minutes. For each incident, the local teams then must develop incident strategies as well as operational management plans for the functional areas of fire, law enforcement, EMS, public health and public works, as well as plan to interface with the fixed facility or the transporter. This forces the team to think quickly, as a team, and shows them that things that used to take the hours in early exercises where the team was in formational stages, can now be done in a matter of minutes, with an increasing level of professionalism, confidence and competency. Use of this exercise is recommended before moving outside.

8. Moving the Whole Thing Outside: The Field Exercise

Do not have a field exercise until two successive tabletops, using different scenarios, have proven that the local incident management system works. In the rural and frontier areas of America, very few responders will be at the Operations Level II, perhaps half will be at Awareness Level I. Some will have no training whatsoever. Regardless, there will be a dilemma. *The local field personnel will be wanting "hands on" because that's what they are trained to do. That is what they want to do and that is why they volunteered to do all that work in the first place.* It is critical that everyone at all levels of government understands this. The responders, the real field people, want to go outside and play. *On the other hand, the reality is that response should be according to EPA, OSHA and the NAERG. The Incident Commander, the Operations Chief and the Controls/Leads for fire, law enforcement, EMS, public works and public health should understand and should be implementing an NAERG-based response plan that is essentially "hands-off" and "minds-on!"*

No one should be allowed to "play" until a management systems is in place that is based on training, equipment, exercising and planning which in turn are to be based on federal regulations and guidelines. No one should be allowed to go to the field, even to do defensive "hands-on," until the management (IC and Ops Chief, plus Operational Functional Controls/Leads) are sure that everyone in Operations, including all field personnel and mutual aid folks, realize that all "hands'-on" must be in compliance with standards and with the "minds-on" management plan developed in the tabletop exercises. Everyone must realize that field exercises in frontier areas are almost universally defensive exercises. All necessary training should have been accomplished and exercised before a field exercise is undertaken, regardless how much chomping at the bit goes on.

9. Federal Agencies, Regulations and National Standards: Their Roles in Frontier Areas

So far the plan has been to sell safety, planning, exercises and hard work using the principles of commons sense, personal and familial safety and community service. It must be remembered that frontier folks are non-governmental types, volunteers, people who do other things for a living at the rate of 60-80 hours a week. The only way to get them "in compliance" is to work them into it slowly. Sow them the personal win-win, the community win-win, the volunteer-organization win-win, then build on that. It is best not to mention federal regulations early on, for maybe the first six meetings, or six months or a year. Build the trust, build the confidence, build the team, show them how they have been "in compliance" (explain it as "progressive activities toward compliance," which will in fact be the case if one follows the course outlined above), and how they can now accelerate that process. Give them the necessary basics, at a level comparable to the frontier need!

[10] See hazard analysis form in Fred Cowie, *Developing Realistic LEPCs . . . .*

A. OSHA

Start with OSHA 29 CFR 1910.120 and give them the actual five level training regulations. Show them how what they have been doing complies with the regulations. Of course, a trainer could introduce these concepts, briefly and simply, early on in the Awareness Level I training, but do not waste a community confidence-and-awareness-building opportunity, such as an Awareness course, by trying to explain federal regulations. They might throw the Awareness out with the bath water, as it were.

Explain OSHA as the employee safety and health people. Employees here being considered as paid or volunteer, thus incorporating volunteer fire fighters and volunteer ambulance personnel. This is also a good time to address the "hazard communication" concept, the MSDSs system and why and how that system works. It is very helpful later on for them to know this. It is not necessary for them to understand hazard communication in order to obtain an MSDS from CHEMTREC for an ER doctor during an incident. It is necessary for them to understand it to help develop and sell a comprehensive planning effort later on.

B. FEMA

FEMA is best marketed as the citizen's friend, the group that puts back up bridges, repairs roads, promotes and manages flood insurance programs. If OSHA looks after the responders, FEMA looks after the citizens. Emergency managers don't manage flood waters or forest fires or earthquakes, they manage the activities of people.

C. EPA

If the role of OSHA and FEMA are best explained by using the words themselves and not the acronym, then this holds true for EPA as well. The Environmental Protection Agency lets the responders and the citizens know that someone is watching out for the air, soil and water which form the environment in which they exist. Someone is keeping tabs on the hazards at the secondary, environmental level and that somebody is the EPA. Sometimes the EPA acts as OSHA, sometimes it acts in concert with FEMA, but it is basically a regulatory agency designed to keep the environment and its inhabitants healthy.

D. DOT

The U.S. Department of Transportation has a role to play in hazardous materials because the business of America runs on chemicals, manufactured in one place and used in another. The regulations and guidelines are voluminous and well intentioned. What rural and extremely rural responders need to know is for all intents and purposes contained in the NAERG, which in the U.S. is sponsored by DOT.

E. *National Fire Protection Association (NFPA)*

Firefighters have a group, the NFPA, which develops national standards for various things, including competencies regarding hazardous materials response. While they are not federal regulations, they are national standards, against which response and response planning can be measured, both before the fact and after an incident, by lawyers, judges, juries and regulators. Firefighters should be familiar with NFPA.

F. *Emergency Planning and Community Right-to-Know Act (EPCRA) or SARA Title III*

EPCRA or SARA Title III brings together many of the hazardous materials initiatives of OSHA, FEMA, EPA and DOT under one roof and provides for the development of an infrastructure for coordinated hazardous materials risk management. That infrastructure is the local emergency planning committee (LEPC) and state emergency response commission (SERC) system. If there has been a coordinated series of viable local exercises and locals understand the NAERG and MSDSs, as well as standard defensive fire fighting and EMS procedures at hazardous materials incidents, and use a basic form of ICS, then SARA Title III's planning and exercising requirements should make complete sense. But do not try to sell SARA Title III first. Sell safety first and the regulation second or third or fourth, it will have far better results.

G. CERCLA, RCRA, CWA, CAA and so on

Let the specialist in these fields, if there are any locally, deal with the niceties of these laws, do on inflict them upon ranchers, farmers, loggers, miners, small business women and men acting as volunteer ambulance drivers and volunteer fire fighters. If there are no local specialists, negotiate with state personnel to supply needed expertise for these areas during complex incidents.

Sample Recommended Practice: An Alternative Approach to Hazardous Materials Program Management in Rural and Frontier Areas

1. Planning Efforts in Frontier Areas

Plans must be the written version of actual field activities. Until sufficient scenarios have been developed and until sufficient emergency operations procedures have been developed for these incidents and "exercised," then intense planning efforts will produce documents, but not realistic plans. However, once the NAERG has been adopted locally, once the management team concept has been accepted and practiced, once the functional areas under Operations have standard operating procedures for the cooperating agencies, once the response community acts like a team, once industry is taken in as a partner and is not perceived as the enemy, then planning efforts are productive. They help take the team to a higher level, a consistently proactive level, a planning team level. Soon various functional components of the bigger team begin to have their own team spirit. Soon smaller sub-groups, for instance industry and fire, vie to see who can have the most efficient and effective internal operating procedures. Soon the plan is a live organism and not a deadly shelf document.

History has shown several things regarding this approach. One: Awareness courses and sequentially harder tabletops are the best builder of community support for hazardous materials and emergency management planning activities. Two: Once the home fire is started, training, planning and exercising become self-generating and the facilitator can move on to another jurisdiction.

One of the key planning issues facing rural communities, especially those that have developed successful Operations Level II defensive response capabilities, is addressing with the local elected officials their responsibility for providing for Level III and Level IV, hazardous materials technician and specialist support. This aggressive, offensive support is required when the incident needs outstrip the local capabilities. During an incident is no time to address "What do we do when we can do no more?"

Whether the actual answer lies with contracted services of providers on retainer or under contract, or with state or federal or industrial responders, the answer should be in writing. It should be kept current and it should be easily and quickly initiated by the incident commander, without unnecessary delay or need for executive approval. Lack of response capabilities does not eliminate public safety or planning responsibilities on the part of a jurisdiction. This is abundantly clear to regulators, judges and plaintiffs' lawyers.

It is of great concern to rural and frontier hazardous materials risk management personnel that wholesale distribution facilities for anhydrous ammonia and propane, tank farms for flammable liquids, and co-ops with large quantities of pesticides and farm chemicals in or in close proximity to small towns with little or no response capabilities. It must be remembered, that the ability to contract for hazmat response services from a distant urbanized area, with perhaps six or ten hours elapsing before the arrival of the first response truck, does not alleviate the problems caused either by transportation or fixed facility releases in small towns.

2. Training Efforts and Additional Equipment in Frontier Areas

Simultaneous with a higher level of planning efforts comes increased training efforts. The different scenarios have shown responders their weaknesses, their voids, their shortcomings. They see the real personal and professional need for further training. They begin to ask for more training, a higher level of training, more intense training. People want to become functional team leaders, operational leaders, incident commanders. People want more specific training on baseline chemicals: acids, chlorine, anhydrous ammonia. People want new equipment and the training to use it.

Training monies are often the easiest for agencies to come by, through state or federal training grants. Equipment is harder to find, but industrial benefactors can be found and monies saved through training grants can be reallocated to equipment purchases. A process of continuous, incremental improvement leads to increased planning and training activities.

Hazardous materials response efforts in small towns, where no full team will ever be found due to tax base, population base and industrial base problems, have been known to spur on regional efforts. In certain rural areas, similar closely-located communities have attempted to pool personnel and equipment to field regional teams. These teams plan to train together and come together upon the arrival of the different members to the incident site from four or six surrounding communities.

It may take five years of hard work, but it will never happen if the process isn't started now. It will never happen if everyone, or sometimes anyone, says it can never happen. Yet, it can and has happened, but it takes a logical process, geared to rural and frontier cultural and jurisdictional realities.

One of the most logical and most productive ways to obtain training is to approach the local industry representative, such as a anhydrous distributor, a trainmaster or a tank farm operator, and request set-aside training for local responders or for spaces for local responders at local industry training classes. This not only builds teams and trust, it also facilitates response when incoming industry responders are familiar with local governmental or volunteer responders. It is also a great idea to contact state, regional or national CAER® and TRANSCAER® representatives, railroad training car representatives, petroleum industry representatives, the Chlorine Institute, the state Department of Agriculture or Environmental Quality, EPA, DOT, FEMA and other federal agencies or private organizations to learn about upcoming training opportunities, most of which or free or have but a nominal cost.

3. Building on the Baseline

Once the baseline chemicals are accepted as just that, the foundation of local hazardous materials risk management; when the local PPE supply has grown to a level to handle the hazards involved with baseline chemicals; after sufficient scenarios have been exercised to develop a local incident management system with team members familiar with each other and the ICS system; and at the time the local team is just that, a team, then the time has come to go past the baseline, to build on the foundation.

This can be done, well, very and logically. In the developmental exercise or practice situation with their local scenarios, the facilitator encourages and directs the players to design the scenarios which will allow them to **safely and successfully practice** their parts. Once the fire folks have handled chlorine, acids, anhydrous and flammable liquids successfully sufficient times; after EMS has triaged and transported a variety of standard cases; when law enforcement has proven its mettle with crowd control and traffic jams; sanitarians have managed disposal and road crews have diked and barricaded to their hearts content, then it is time to crank up a notch the different factors involved in the scenarios in order to **stress the seasoned responders** (remember, that early on stress is not the key, practice is) and force them to a higher level. How is that done?

Logically and systematically! It must always be kept in mind that given the local tax base, population base, commerce base and industry base, there is an optimum level of response for that given community. Analysis of the local conditions can result in a fairly accurate determination of **current** and **optimum** response levels.[11] Keep in mind, one does not want to intentionally design a scenario to over stress the local capabilities without simultaneously accounting for mutual aid, state, federal or industrial resources to meet the local need.

Given the above, cranking up the scenario is simple. For law enforcement, it is possible to make the incident a crime scene, using either an environmental crime, a terrorist crime or a dumb crime. For fire, the chemicals can be made more toxic, more flammable, and more corrosive. For fire and EMS the injuries can be more life threatening, the extrication more complex, the interface with the chemicals more intense. For public health, spread some steaks around from a frozen food truck, drop some pesticides into surface water, and cause a more serious aquifer-related problem. For public works, have a need for damming and diking, dust remediation, or extensive barricading. Have some cows and horses affected, fishing or hunting seasons impacted or tourist traffic, if you want to see some real action. But never, **never**, do any of this without both the input from and the concurrence of the affected functions and their associated agencies.

The principle of continual small improvements, which works so well in management activities, works well also in scenario design. Even changing the location of an incident, without actually changing the non-location facts of the scenario, changes jurisdictions, lead agencies and the ICS management folks involved in event. Just remember, this is a team-building exercise, a **practice**, a small piece in a long-term process.[12]

4. The Future of Frontier LEPCs and Frontier HazMat

We should be taking our lead from the people, from the responders in the rural and frontier areas, from those affected by our decisions. The lead should not be coming from the regulators or the legislators. The laws, especially SARA Title III, were designed for the populace and the local responders. The laws and the regulators that enforce them should not become the focus of attention. The goal should remain the same, support of local responders and citizens regarding hazardous materials risk management at the local level. Federal agencies should be looking to the towns, not to downtown. They should be using the knowledge and experience of the successful rural and frontier LEPCs to develop initiatives designed to create more successful ones.

It should be remembered that everything depends not upon regulation and enforcement, but upon finding one local person to take the lead and develop the local team over a period of three to five years. It should be acknowledged that few, less than half probably, of all extremely rural counties will ever achieve successful LEPCs. The goal should be an extremely rural, frontier "standard of care," which accepts the U.S. DHHS and U.S. Congress reality-based concept of frontier status. And everyone should accept that someone has to act as the skilled facilitator of the local process.

How can the federal government facilitate this local process? **Think outside of the lines!** Perhaps OSHA could promote something resembling enhanced-operations Level II or focused-technician Level III which would easily allow for in-compliance rural responses to acid or chlorine or other baseline releases in extremely rural areas. Remember, the responses will always occur (without the non-existent frontier hazmat team) and they will most often occur out-of-technical-compliance if the standard, the compliance standard, is not flexed. DOT could allow for equipment purchases for basic, non-extravagant items under training grants. EPA, FEMA and DOT, under training grants, could allow for overtime or replacement-time payments for volunteers (who are losing wages) who are currently donating nights and weekends to all exercises or training. This would do nothing more than make them equal with paid responders. Or perhaps Congress could fund mobile in-state regional response teams for areas (and states) without sufficient tax, population or industry bases.

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[11] See Cowie, *"Beyond Rural . . . ."* concerning response level determination.

[12] See Cowie, "*Visioning . . . .*" for fundamental basics of this process.

Figure 1

Figure 2

Figure 3

Figure 4

Hazardous Materials

Incident Response Training Guidelines

Hazardous Materials Response-Related Standards

Introduction

There are important Occupational Safety and Health Act (OSHA) or Environmental Protection Agency (EPA) regulations that must be followed when responding to an incident involving hazardous materials. These include regulations which prescribe level of protective equipment, selection and use of respirators, training curriculum criteria, or procedures that must be followed during the response, stabilization, and recovery efforts. This section of the *Guidelines* contains an quick reference summary of these regulations.

Regulations and standards are often referred to as standard of care documents. While portions of existing regulations and standards may vary in application by individual State, Tribal, Territory and local policy, it should be remembered that these established procedures and guidelines are federal requirements that are considered by the emergency response profession in general as minimal and essential standards of care. Therefore it is important that employers, training program managers, and instructors be aware of and familiar with the provisions of these standard of care documents.

The following summaries of response related regulations are intended to provide a quick reference guide and overview of the provisions of each regulation. For the details of any regulation or standard covered in this summary it is necessary to review the entire section or document. Do not use this summary for compliance with the regulation, use the official document.

Summaries are provided in this section for the following regulations and standards of care:

-Hazardous Waste Operations and Emergency Response (HAZWOPER) 29 CFR 1910.120
- First Responder Operations Level Offensive Operations: OSHA Quips
- Employee Records 29 CFR 1910.20
- Personal Protective Equipment, including Eye and Face Protection 29 CFR 1910.133, Respiratory Protection 29 CFR 1910.134, Occupational Head Protection 29 CFR 1910.135, and Occupational Foot Protection 29 CFR 1910.136, Hand Protection 29 CFR 1910.138
- Confined Space Operations 29 CFR 1910.146
- Ventilation for Confined Space Operations
- Bloodborne Diseases 29 CFR 1910.1030
- Lockout / Tagout 29 CFR 1910.147
- Right-to-Know and Material Safety Date Sheets (MSDS) 29 CFR 1910.1200
- Joint Commission on Accreditation of Healthcare Organizations
- Process Safety Management of Highly Hazardous Chemicals 29 CFR 1910.119

HAZARDOUS WASTE OPERATIONS and EMERGENCY RESPONSE (HAZWOPER)

29 CFR 1910.120

(Federal register Vol.54 No.42/ Monday March 6, 1989)

This document was published as final rule Monday March 6, 1989 and contains regulations pertaining to worker safety at several types of hazardous waste sites and emergency response operations without regard to the location of the site. The vast majority of public sector employees will be covered under the emergency response portion of the regulations. The purpose of this document is to provide the means to identify, evaluate, and control safety and health hazards, and provide a program for emergency response in hazardous waste operations. Due to the complexity of this material, it is recommended that you consult a safety professional or local OSHA office for further interpretation and application. Because of the breadth and overall importance of this document, two summaries are provided. The first is a summary of the requirements, for the general reader. The second is a summary of the sectional organization of the document, to assist readers wishing to subsequently reference or review specific sections of the regulation.

1. Summary of HAZWOPER Requirements

General Requirements

Written plan shall be made available to anyone on the site, as well as to federal authorities.

- All personnel on the site shall be informed of the hazards.
- Personal protective equipment shall be provided at no cost to the employees.
- A pre-designated representative of the company shall be appointed to become the incident commander. He/she will control the Incident Command System (ICS) in case of emergency.
- A written standard operating procedure (SOP) shall be developed for every purpose.
- A written hazardous communication program shall be implemented based on the information in Hazardous Communication Right-To-Know (RTK) section of this document.
- All excavations during site preparation shall be shored or sloped in a manner that will not allow accidental collapse.
- A post-emergency response plan that involves clean-up, follow-up, and start-up procedures shall be developed.

Written Safety and Health Program

- Organizational Structure
  - -show the specific chain of command
  - -review and update as often as needed to reflect the current status
- Comprehensive Work Plan
  - -address the specific tasks and objectives of the site operation
- Site Specific Safety and Health Plan
  - -shall contain hazardous analysis specific to that site
  - -shall include employee training on all hazards
  - -personal protective equipment to be used

- control measures to be used
- frequency and types of monitoring
- decontamination procedures
- emergency response plan
- confined space entry procedures (see *Confined Space* in this document)
- spill containment plan and procedures shall be outlined
- standard operating procedure (SOP) shall be outlined
- medical surveillance plan requirements shall be outlined and include:
  - a written surveillance program
  - all physical exams of site workers
  - accurate records of medical surveillance
  - hazardous analysis and monitoring
  - on-site record keeping

Training

- All personnel on the site shall be trained in hazardous waste operations before they participate in any activity that could expose them to hazardous substances, safety, or health hazards.
- Only authorized personnel shall be allowed on the site.
- Content of training:
  - names of persons responsible for site safety and health
  - safety, health, and other hazards present on the site
  - use of personal protective equipment
  - safe work practices
  - safe engineering practices
  - medical surveillance requirements
- General site workers, laborers, and supervisors shall have a minimum of 40 hours of off-site instruc tion and three days on-site training under the direct supervision of a trained, experienced supervisor.
- Workers on the site occasionally and workers regularly on site shall receive at least 24 hours of off-site instruction and one day of on-site training by a trained, experienced supervisor.
- Regular workers required to wear respirators shall undergo an additional 16 hours of off-site instruction and two days of on-site training by a trained, experienced supervisor.
- Management and supervisors shall attend at least 40 hours of off-site instruction and three days of field supervised training and an additional 8 hours of specialized training on topics such as personal protective equipment, employee training, spill containment, and monitoring techniques.
- Trainers shall be qualified to instruct employees and have completed a trainer's course and attained certification as a trainer from that course.
- Each certified worker shall undergo an additional 8 hours refresher training course annually.

Record Keeping

- Written programs and documentation:
  - Organizational Structure
  - Work Plan
  - Standard Operating Procedures (SOP's)
  - Medical Surveillance Program
  - Decontamination Program
  - Emergency Response Plan
  - Safety and Health Program
  - Hazardous Communication Program
  - Training Program
  - Post Emergency Response Plan

2. Summary of HAZWOPER by Sections

(a) Scope, application, and definitions *pg 9317*

1. Scope - This section covers the following operations, unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards.
   - (i) Clean-up required by a government
   - (ii) Work at RCRA sites
   - (iii) Voluntary clean-up at sites recognized by a government
   - (iv) Work at treatment, storage, and disposal sites
   - (v) Emergency response operations

2. Application - Defines who regulations apply to
   - (i) All applicable 1910 and 1926 regulations of Title 29 apply to hazardous waste and emergency response
   - (ii) Hazardous substance clean-up operations must comply
   - (iii) Operations at sites listed in 1 (iv)
   - (iv) Emergency response operations which are not listed in 1 (I) through 1 (iv) must only comply with the requirements of paragraph (q)

3. Definitions

Buddy system - groups of 2 or more to provide rapid response to employees in the event of an emergency

Clean-up operation - work removing hazardous substances

Decontamination - removal of hazardous substance to preclude adverse effects

Emergency response or responding to emergencies - response effort from outside the immediate release area or by other designated responders (i.e. mutual aid groups, local fire departments, etc.)

Facility - any building, structure, pipeline, etc.

Hazardous materials response (HAZMAT) team - means an organized group of employees, designated by the employer, who are expected to perform work to handle and control actual or potential leaks or spills of hazardous substances requiring the possible close approach to the substance for the purpose of control or stabilization of the incident. A HAZMAT team may be a separate component of a fire brigade or fire department

Health hazard - a chemical, mixture of chemicals, or a pathogen that acute or chronic exposure may occur

IDLH - immediately dangerous to life or health which may cause irreversible health effects

Oxygen deficiency - atmosphere with less than 19.5% oxygen

(b) Safety and Health Program *pg 9318*

- (1) General - required for hazardous waste operations and contains 7 specific areas of planning
- (2) Organizational structure part of site program - describes lines of authority
- (3) Comprehensive workplan of the site program - addresses logistics and resources
- (4) Site-specific safety and health plan part of program - addresses hazards

(c) Site characteristics and analysis *pg 9319*

- (1) General - evaluation used to identify specific hazards
- (2) Preliminary evaluation - performed prior to entry
- (3) Hazard identification - identify hazards to health by inhalation, absorption, etc.
- (4) Required information - gathered prior to employees entering site
- (5) Personal protective equipment - includes chemical exposure protection and respiratory protection
- (6) Monitoring - using instruments to evaluate health hazards
- (7) Risk identification - once hazard is identified evaluate risks involved
- (8) Employee notification - all known chemicals and hazards must be explained to employees

(d) Site control *pg 9320*

- (1) General - appropriate site control measures shall be taken
- (2) Site control program - program to protect employees must be developed

HAZWOPER 29CFR 1910.120

(3) Elements of a site control program - items such as site map, buddy system. etc.

(e) **Training** (this does not apply to emergency responders) *pg 9320*

(1) General - all employees, supervisors, etc. working on site shall be trained

(2) Elements to be covered - names, hazards, PPE, work practices, engineering controls, and medical surveil lance

(3) Initial training

- General site workers must receive 40 hours training off site and a minimum of 3 days field experience .
-Workers on site occasionally - must receive 24 hours training off site and 1 day field experience
-Workers on site in areas where exposures are under permissible limits - must receive 24 hours training off site and 1 day field experience
- Workers with 24 hours of training who may become general site workers must receive 16 additional hours of training and 2 days of field experience

(4) Management supervisor training - on-site management who supervise employees engaged in hazardous waste operations shall receive 40 hours of training and 3 days field experience

(5) Qualifications of trainers - satisfactorily completed training and be an instructor

(6) Training certification - a certificate shall be issued upon completion of training

(7) Emergency response - Those who may respond at a hazardous waste clean-up site and may expose them selves to hazardous substances shall be trained

(8) Refresher training - requires annual refresher training

(9) Equivalent training -documentation of employee's work experience/training

(f) **Medical surveillance** (Pertains to Haz Mat Teams) *pg 9321*

(1) General - Covers hazardous waste/clean up workers and paragraph (q)(9) members of a hazmat team and hazardous materials specialist

(2) Employees covered - Includes employees who are exposed to hazardous substances or health hazards at or above the permissible levels, those who wear a respirator for 30 days or more a year, all employees injured due to over exposure from an emergency involving a hazardous substance, and members of a hazmat team

(3) Frequency of medical examinations and consultations/ includes hazmat teams - prior to assignment, every 12 months unless physician states longer (no longer than biennially), at termination of employment or reassignment, as soon as possible upon notification that employee has developed signs or symp toms indicating possible over exposure to hazardous substance or health hazards, or that employee was injured or exposed above the permissible exposure limits/levels or at more frequent times if physician determines necessary.

(4) Content of medical examinations and consultations - Work or job related items

(5) Examination by a physician and cost - licensed physician at no cost to employee

(6) Information provided to physician - employer shall provide appropriate job related information, a copy of 29 CFR 1910.120, description of PPE the employee will use, and information from previous medical examinations

(7) Physicians written opinion - Shall provide information to employer and employee regarding findings of exam and tests

(8) Record keeping - Records of medical surveillance examinations, physicians opinions, medical complaints, and other information

(g) **Engineering controls, work practices, and personal protective equipment for employee protection** *pg 9322*

(1) Engineering controls, work practices, and PPE for substances regulated in Subparts G & Z

(2) Engineering controls, work practices, and PPE for substances not regulated in Subparts G & Z

(3) Personal protective equipment - Describes all aspects of PPE

(4) Totally encapsulating chemical protective suits - Describes chemical protective clothing

(5) Personal protective equipment (PPE) program - Need for written program describing all aspects of clothing selection and use

(h) **Monitoring** *pg 9323*

(1) General - Describes general concepts of where and how monitoring is applied

(2) Initial entry - Air monitored upon entry to identify any IDLH or flammable condition

(3) Periodic monitoring - Shall be conducted when the possibility of an IDLH or flammable atmosphere has developed and at other times

(4) Monitoring high-risk employees - After clean-up phase

(i) Informational programs required by employer at certain sites *pg 9323*

(j) Handling drums and containers *pg 9323*

(1) General - Handling, transportation, labeled, and disposal

(2) Opening drums and containers - Procedures for opening containers, protective equipment, safety precautions, and others

(3) Material handling equipment - Selection of proper equipment

(4) Radioactive waste - special precautions for this type material

(5) Shock sensitive wastes - Special precautions for these materials

(6) Laboratory waste protocols - Special precautions for laboratory waste

(7) Sampling drum and container contents - Done in accordance with site safety plan

(8) Shipping and transport - procedures to store and ship these containers

(9) Tank and vault procedures - Procedures similar to drums and containers

(k) Decontamination *pg 9325*

(1) General - Procedures shall be developed and followed

(2) Decontamination procedures - Procedures shall be developed, communicated to staff, and implemented before any employee or equipment may enter site

(3) Location - Done in an area to minimize exposure

(4) Equipment and solvents - Shall be properly disposed of

(5) Personal protective equipment - Shall be decontaminated, cleaned, laundered, maintained or replaced as needed

(6) Unauthorized employees - Shall not remove clothing from change rooms

(7) Commercial laundries or cleaning establishments - shall be informed of potentially harmful effects of exposure

(8) Showers and change rooms - When a shower is needed for decontamination special procedures special procedures are needed and must meet the requirements of 29 CFR 1910.141

(l) Emergency response by employees at uncontrolled hazardous waste sites *pg 9325*

(1) Emergency response plan - Shall be developed and implemented by employer

(2) Elements of the emergency response plan - Describes 11 minimum elements

(3) Procedures for handling emergency incidents - Includes features of site, and seven operational procedures to be followed

(m) Illumination - Provides guidelines for amount of light to be provided *pg 9325*

(n) Sanitation at temporary work place *pg 9325*

(1) Potable water - Such as for drinking

(2) Nonpotable water - Such as for firefighting purposes

(3) Toilet facilities - Describes number and types

(4) Food handling - Shall meet applicable regulations of local jurisdiction

(5) Temporary sleeping quarters - Heated, ventilated, etc.

(6) Washing facilities - In near proximity to work site

(7) Showers and change rooms - Provisions for facilities

(o) New technology programs *pg 9326*

(1) Employer shall develop and implement procedures for new technologies and equipment

(2) New technologies - Such as foam, absorbents, adsorbents, etc. shall be evaluated

(p) Certain operations conducted under RCRA of 1976 *pg 9326*

(1) Safety and health program - Develop and implement written plan

(2) Hazard communication program - Must meet 29 CFR 1910.1200

(3) Medical surveillance program

(4) Decontamination program
(5) New technology program
(6) Materials handling program
(7) Training program
(8) Emergency response program

(q) Emergency response to hazardous substance releases *pg 9328*

This paragraph covers employers whose employees are engaged in emergency response no matter where it occurs

(1) Emergency response plan - Shall be developed in writing and implemented to handle anticipated emergencies
(2) Elements of an emergency response plan - As a minimum the plan shall address 11 elements which range from pre-emergency plans to equipment
(3) Procedures for handling emergency response - Includes 10 operational procedures including the need for an incident commander and site safety officer
(4) Skilled support personnel - Includes operational procedures for personnel (not necessarily the employer's own) for such functions as equipment operators of cranes, or earth moving
(5) Specialist employees - Include employee who as part of their job have with special knowledge, skill or ability which includes training an competency demonstration
(6) Training - Includes five levels of response training

Note: Employer should read the job descriptions of these five levels to determine which best describes the type or level of activity their employees will participate in. This will determine the level of the employers emergency response plan and level of training required. See pg 9329

(i) First responder awareness - no set hour requirement, has 6 competency skill areas
(ii) First responder operations - Shall receive a minimum of 8 hours of training which include the 6 competency areas of First Responder Awareness as well as the 6 competencies specifically for this level
(iii) Hazardous materials technician - Shall receive 24 hours of training in 9 competency areas plus those required in items (ii) and (iii).
(iv) Hazardous materials specialist - Shall be trained to the level of technician in addition to 9 additional competencies.
(v) On scene incident commander - Assumes command of an incident beyond the awareness level, has 24 hours of training equal to the first responder operations level plus 6 additional compe tencies

(7) Trainers - Shall have completed a training course for the subjects they are expected to teach along with instructional experience
(8) Refresher training - Those employees trained under (q)(6) shall receive annual refresher training or demon strate competencies
(9) Medical surveillance - Members of a HAZMAT team and hazardous materials specialist shall receive a baseline physical exam (see paragraph (f)) and any emergency response personnel who exhibits signs or symptoms associated with a hazardous materials exposure shall be provided with medical consultation (see paragraph f (3)(ii)
(10) Chemical protective clothing - Clothing and equipment by HAZMAT team members shall meet requirements of (g)(3) - (g)(5)
(11) Post-emergency response operations - Upon completion of emergency response specific conditions for removal of contaminated material and clean-up must be followed

Appendix A - Personal protective equipment test methods *pg 9330*

A. Totally-encapsulating chemical protective suit pressure test procedures
B. Totally-encapsulating chemical protective suit qualitative test procedures

Appendix B - General description and discussion of the levels of protection and protective gear *pg 9332*

Part A - Personal protective equipment is divided into four categories based on the degree of protection afforded (levels A,B,C,D)
Part B - Types of hazards for which levels A,B,C,D protection are appropriate

Appendix C - Compliance guidelines *pg 9333*

1. Occupational safety and health program is discussed
2. Training (emergency response pg 9334, middle column, second paragraph)
3. Decontamination procedures are outlined
4. Emergency response plans (Hazardous Materials Emergency Response Planning Guide - NRT 1 is helpful)
5. Personal protective equipment programs is reviewed
6. Incident command system (ICS) is discussed
7. Site safety and control plans are important to the incident commander

Appendix D - References *pg 9335*

Amendments to original document of March 6, 1989
(Federal Register Vol. 59 No. 161/ Monday August 23, 1994

Appendix B - Last two paragraphs were revised which describes chemical protective clothing
Appendix E - Training curriculum guidelines *pg 43270*

It is noted that the legal requirements are set forth in the regulatory text of 1910.120. The guidance set forth here represents a highly effective program that in the areas covered would meet or exceed the regulatory requirements. In addition, other approaches could meet the regulatory requirements.

Suggested core criteria: *pg 43270*

1. Training facility - Sufficient resources to conduct training
2. Training director - Person in charge
3. Instructors - Criteria for staff including instructional review procedures
4. Course materials - Reviewed and approved by training director
5. Students - Includes screening procedures
6. Ratios - Recommends student-instructor ratio
7. Proficiency assessment - Includes testing procedures
8. Course certificate - Written documentation of completion of course
9. Record keeping - Describes record keeping procedures
10. Program quality control - Annual audit of program quality

Suggested program quality control criteria: *pg 43271*

A. Training plan - Is it adequate and appropriate
B. Program management, training, director, staff, consultants - Is the program adequate and are staff effective
C. Training facilities and resources - Is it adequate and appropriate
D. Quality control and evaluation - Quality control and evaluation plans
E. Students - Adequate procedure for accepting students
F. Institutional environment and administrative support - Enough help
G. Summary/evaluation questions - Overall program evaluation procedures

Suggested training curriculum: *pg 43272*

A. General hazardous waste operations and site-specific training
   1. Off-site training - Hazardous waste operations
   2. Refresher training - Criteria for annual refresher
   3. On-site training - Specific site training/information
B. RCRA Operations training for treatment, storage, and disposal (note: See appendix for additional information about TSD operations)
   1. Minimum training requirements
   2. Provide training prior to entering site

C. Emergency response training - 1910.120 (q) - may be appropriate for public sector emergency response personnel

a. General considerations - May require interaction between emergency responder and site operators

(1) First responder awareness
(2) First Responder operations
(3) Hazardous materials technician
(4) Hazardous materials specialist
(5) Incident commander

First Responder Operations Level Offensive Operations: OSHA Quips

First Responders that are trained in emergency response under the Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation 29 CFR 1910.120q are generally trained to the First Responder Awareness and First Responder Operations levels, but are not generally trained to the Technician level. As a result, First Responders are limited to engaging in only defensive operations and are legally prevented from approaching the release to plug, patch or otherwise stop the release.

For decades first responders such as firefighters and public works personnel routinely plugged leaks in containers such as automobile fuel tanks, truck saddle tanks, and leaks in residential natural gas lines. However, the HAZWOPER regulation precluded first responders from continuing to perform these tasks.

To facilitate the ability to engage in this type of offensive work many agencies have written standard operating procedures (SOP) that provide guidelines for conducting these procedures. They submit the SOP to the Occupational Safety and Health Administration (OSHA) that has jurisdiction and, in most cases, find that OSHA will approve the SOP. Once the SOP is approved by OSHA, the actions are considered acceptable by operations level personnel as long as the scope of the SOP is not violated.

For jurisdictions that desire to have their operations level personnel engage in offensive operations they need to:

A. Develop a separate Standard Operating Procedure for each offensive operation, such as plugging vehicle fuel tank leaks, plugging saddle tank leaks, plugging natural gas line leaks. The content of each SOP should be, at a minimum:

1. The title of the SOP
2. The scope of the SOP
3. The PPE required for conducting the offensive operation.
4. The actual procedure to be followed when engaging in the offensive operation
5. The training required prior to allowing personnel to engage in the offensive operation, with emphasis on the proper PPE and NOT exceeding the scope of the SOP

B. Submit the SOP to your OSHA representative for approval

C. Following approval of the SOP by your OSHA representative, train your personnel as defined in the SOP

D. Don't allow your trained personnel, in actual field operations, to exceed the scope as defined in the SOP

By addressing these simple steps, the capabilities of your first responder operations level personnel can be greatly enhanced and your dependence on Technician level personnel will be reduced for these routine type of incidents.

OSHA Quips

The following question/answer (Quips) interpretations of OSHA 1910.120 have been issued related to the subject of Operations Level offensive operations.

Operations Level Firefighters.
29 CFR 1910.120(q)(6)(ii)

May an emergency responder trained only at the operations level under paragraph (q)(6)(ii) of the standard perform aggressive or offensive actions at an emergency involving a small spill or leak of gasoline without the employer being in violation of the Standard? Typical actions would include plugging or patching a leaking automobile gas tank.

Operations level training by itself is designed to enable emergency responders to safely perform defensive action at a safe distance from the point of release; personnel who have not been trained beyond the operations level are not considered adequately trained to take aggressive action at the point of release and are not permitted to do so. Such action would be in violation of 29 CFR 1910.120(q)(6)(iii), which defines the training requirements for personnel designated to take aggressive action (i.e., hazmat techs).

However, "a small spill or leak of gasoline" would not necessarily constitute an emergency or potential emergency covered under the HAZWOPER standard. Firefighters with or without operations level training may be permitted to handle non-emergency releases of an identified hazardous substance which they are adequately trained and equipped to control. Where an emergency or potential emergency release has occurred, personnel who have not been trained beyond the operations level may perform defensive action, only, deferring aggressive action to more highly trained personnel.

De Minimis Training Policy for Firefighters.
29 CFR 1910.120(q)(6)(iii)

29 CFR 1910.120 is a performance based regulation, providing some flexibility to the employer in meeting the requirements of the regulation. With regard to training, paragraph (q)(6) states " training shall be based on the duties and function to be performed by each responder;" all employees must be adequately trained to perform their assigned job duties without danger to themselves or others.

Hazardous materials technician (hazmat tech) training is necessary for emergency responders who take aggressive action in a potentially dangerous area to stop the release. OSHA may, in appropriate circumstances, consider violations of hazmat tech training to be "de minimis," however, when they do not impact on the ability of responders to safely perform their assigned job duties. The burden would be on the employer to demonstrate to OSHA that the violation did not pose a hazard to the safety or health of employees and that the violation was in fact de minimis in nature.

Therefore, in certain limited circumstances, personnel who do not meet all of the training requirements for the hazmat tech level, but who have training beyond the first responder operations level, would be considered by OSHA to be adequately trained to perform a specific task not otherwise permitted for operations level personnel.

The September 20, 1991 letter addressed to Ron Runge to which you refer was intended to apply only to firefighters. OSHA considers properly trained firefighters to already have extensive training and experience in handling gasoline or other fuel incidents by nature of their regular job duties. However, where the identity of the hazardous substance involved in an uncontrolled release cannot be determined, or where the hazardous substance is one for which firefighters have not received specific training or do not have adequate control equipment, aggressive action should be deferred to a fully trained HAZMAT team. Further, response by a fully trained HAZMAT team may be necessary whenever there are factors which may complicate response efforts.

Consideration for the de minimis policy for 29 CFR 1910.120(q)(6)(iii) is generally limited to small scale emergency involving limited quantities of a known hazardous substance which firefighters are adequately trained and equipped to handle.

Roles and Duties, Hazard Assessment, and Firefighters.
29 CFR 1910.120(q)(2)(ii) and (q)(6)(iii)

You can that the HAZMAT team in one of your urban counties has adopted the policy that gasoline spills of 25 gallons or less do not require response by a HAZMAT team, and can be safely handled by firefighters with "operations plus" training.

OSHA has no authority to determine how State and local authorities divide responsibilities between their fire departments and HAZMAT teams, and express no view on that issue. However, if fire department members with inadequate HAZWOPER training tool aggressive action to respond to a hazardous substance emergency, a violation of 29 CFR 1910.120(q)(6)(iii) would exist; this would not be the case is the fully trained and equipped HAZMAT team were to respond. OSHA does acknowledge that in many cases firefighters may have the capabilities to safely respond to spills where fewer than 25 gallons of gasoline are involved without full hazmat tech training provided they have extensive training in the safe handling of gasoline.

However, the hazard assessment of which incidents can be safely handled by responders without full hazmat tech training cannot be based on quantity alone. Ambient conditions and specific hazards at the scene must be included in the hazard assessment. Which incidents can be safely handled by responders who do not meet all of the competencies required for hazmat tech level would depend also on the extent and content of the additional training beyond the operations level which they had received.

Employers must establish in their written emergency response plan, required in paragraph (q)(2)(ii), guidelines for determining in which scenarios aggressive action should be deferred to the fully trained HAZMAT team. Personnel who will be expected to take aggressive action, but who have not been assigned the full duties of the hazmat tech level, should as part of their training be instructed in these guidelines to enable them to determine which scenarios are beyond their ability to handle safely.

Firefighters Responding to Propane and Gasoline Fires.
29 CFR 1910.120(q)(6)(ii) and (iii)

Firefighters trained to the operations level, who are also trained in the hazards of propane, may enter the danger area to shut off the valves that will starve the fire and thus extinguish it. Normally, employees trained to the operations level would be restricted from taking aggressive action. This is considered to be a special case. The principle hazards from propane are fire and explosion, not toxicity. Because propane fires are common, most firefighters are fully trained and equipped to respond to propane fires, including taking aggressive action by shutting off the valves in the danger area.

If firefighters are fully trained and equipped (which is a high degree of training), and have also received first responder operations level training, OSHA believes they have sufficient training to take aggressive action due to propane's relatively low toxicity.

It would be only a technical violation of 29 CFR 1910.120(q)(6) for not having the additional training required of a HAZMAT technician if a firefighter took aggressive action in the danger area during a propane fire of leak, was fully trained and equipped to handle the fire and had first responder operations level training. In this circumstance OSHA would not issue a citation.

Releases of gasoline similar to the example involving propane discussed above may be addressed by

operations level emergency responders if they have the required PPE, emergency response equipment, and specific training in the safety and health hazards associated with gasoline.

Employers who expect firefighters to shut off a gasoline valve in the danger area, and who can show that employees are trained to the operations level and adequately trained in the hazards of gasoline, have committed a technical violation of 1910.120 (q)(6)(iii) for such employees not having the training required of a HAZMAT technician.

NOTE: The fire and explosion hazards of propane and gasoline are very substantial. The interpretations herein are applicable only when firefighters are fully trained and equipped to handle the explosion and fire hazards of propane, gasoline, or similar gases and liquids.

Firefighters Taking Aggressive Action and Technical Violations
29 CFR 1910.120(q)(6)(iii)

It would be only a technical violation of 29 CFR 1910.120(q)(6) for not having the additional training required of a HAZMAT technician if a firefighter took aggressive action in the danger area during a propane fire or leak, was fully trained and equipped to handle the fire and had first responder operations level training. In this circumstance OSHA would not issue a citation.

If an injury occurred during an emergency response involving these responders (operations level plus additional training) the CSHO would need to consider whether the responders' training and experience were sufficient for the tasks being performed.

A violation of training requirements that resulted in an actual injury to an employee during an emergency response by definition cannot be a "technical violation." Thus, if an injury occurred and the CSHO determined that the responders' training and experience were not sufficient for the tasks being performed, then a citation should be issued noting a violation of 29 CFR 1910.120(q)(6)(iii) and carrying a penalty that requires abatement. Whether abatement should require full training in all of the competencies of the HAZMAT technician level, or whether certain training requirements could safely be omitted, would depend on the training needed to safely perform the tasks in question.

If, however, the CSHO determined that the training which had been provided to the employees in question had been provided to the employees in question had been adequate, then the training violation would be considered a de minimis violation and no citation would be issued for inadequate training. In this situation the CSHO might determine that the cause of the injury was due to a violation of some other requirement of 29 CFR 1910.120 or other standards, for which a citation carrying a fine and requiring abatement would be appropriate.

EMPLOYEE RECORDS

29 CFR 1910.20

The purpose of this section is to give general guidelines concerning the retention of and employee access to medical and exposure records. It is always advisable to make copies rather than loan out documents. If the request for documents is of a serious nature, seek legal counsel.

Current employees, former employees, employees being transferred to a new location, and their representatives have the right to review and receive a copy of any record mentioned below which is *relevant to that employee*.

Medical Records

- Audio Testing
- Chest X-Ray *(These must be available for review, but they do not have to be loaned or copied)*
- Descriptions of Treatments
- Employee Medical Complaints
- First Aid Log
- Post-Employment Physical
- Pre-Employment Physical
- Previous Employment Medical Tests
- Respiratory Fit Testing *(A test to determine which size respirator to wear and to test its fit)*

Exposure Records

- Air monitoring records
- Copy of 29 CFR 1910.20, access to employee exposure and medical records
- Employee medical access training records *(The documentation that informs employees of their right to access exposure and medical records)*
- Measures for controlling worker exposure to chemicals *(Personal protective equipment, ventilation, material handling procedures, etc.)*
- Methodologies used to gather data *(Types of monitoring devices used, procedures, areas included, and substances monitored such as vapors, fumes, gases, or dusts)*
- Noise monitoring records
- Records by the Assistant Secretary of Labor for Occupied Safety and Health
- Record of OSHA 200 Log *(A list of occupational injuries, illnesses, and deaths suffered by employees, which is required by OSHA for all companies employing 10 or more employees)*

Records Not Required to be Released

- Drug testing results
- Health insurance claims *(If it is kept in a file other than the employee's medical file, you do not have to release this information)*
- Medical records prepared for litigation
- Records by the Assistant Secretary of Labor for Occupational Safety and Health
- Voluntary Employee Assistance Programs (EAP) *(Drug and alcohol programs, family/personal counseling)*

Employee Records OSHA 1910.120

Employee Requirements to Obtain Medical Records

Employee and representatives may obtain medical records according to the following conditions:

- The request is in writing and contains the following:
  - company name
  - date authorization will expire, if applicable
  - date of request
  - description of medical information requested
  - employee name
  - employee representative name, if applicable
  - employee signature
  - purpose for request

- If authorization is revoked, it shall be in writing.

Employer Rights and Responsibilities

- The employer can only require employee to answer questions that aid in location of information. *(i.e., dates, locations where employee worked during time in question)*
- Employer shall not charge for the first copy or any additional information at another time.
- Employer may charge a reasonable price for a second copy of the same information received earlier.
- If a copy machine is not available, the documents may be loaned for a reasonable time to have copies made. *(It is best to have office personnel make a copy to avoid the possibility of loss.)*
- Medical records shall be kept on file for 30 years after an employee's termination.
- Names and identifiers of other employees shall be deleted.
- The information requested shall be released within 15 working days. If this is not possible, an explanation must be given to employee and a date of expected compliance.
- X-rays may be loaned at employer discretion, but viewing in house is sufficient and preferred.

Training

Employees first entering work shall be informed annually of the following:

- the existence, location, type of records, and person to contact to retrieve information
- the procedure for accessing records in writing
- their right to access medical records

Transfer or Disposal of Medical Records

- If a business is sold, the successor shall maintain the previous owner's records.
- If a business is closing, current employees shall be notified at least three (3) months prior to closing that they have a right to receive their records.
- OSHA shall be notified three months in advance of closing that you intend to dispose of medical and exposure records.

Record Keeping

Employers shall retain the following records for duration of employment plus 30 years:

- Analysis using Exposure Records
- Exposure Records
- Material Safety Data Sheets
- Medical Records
  (Time begins after employee termination)

PERSONAL PROTECTIVE EQUIPMENT

The purpose of this section is to outline general requirements for respirators, eye, head, foot, and fall protection. Personal protective equipment (PPE) is not always the best method for controlling hazards. However, it can be the fastest and most economical method of protecting employees from known hazards.

29 CFR 1910.132 General Requirements

(a) Protective equipment shall be provided, used, and maintained to protect employees

(b) Where employees provide their own protective equipment, employer must assure its adequacy

(c) All personal protective equipment must be of safe design and construction

(d) Hazard Assesment and Equipment Selection
- (1) Employer shall assess the workplace to determine if hazards are present, or are likely to be, which necessitate PPE
- (2) if so, employer shall: select and require use of appropriate PPE; communicate selection decisions to employees; select PPE that
- (3) Written certification of hazard assessment required

(e) Defective or damaged personal protective equipment shall not be used

(f) Employers shall provide training to all employers required to use PPE
- (1) PPE training must cover: when PPE is necessary; what PPE is necessary; how to don, doff, adjust and wear PPE; limitations of PPE; proper care, maintenance, useful life and disposal
- (2) Employees must demonstrate an understanding of training topics and ability to use PPE
- (3) Retraining may be required
- (4) Written certification of training required

29 CFR 1910.133 Eye and face protection

(a) General provisions
- (1) Protective eye and face equipment shall be required when there is a reasonable probability of injury than can be prevented by such equipment.
- (2) Protectors shall meet minimum requirements for fit, durability, etc.
- (3) Persons with corrective lenses in spectacles - Specifies special equipment
- (4) Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer.
- (5) Employer must ensure that each affected employee uses equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation.

(b) Criteria for devices
- (1) Purchased after July 5, 1994 shall comply with ANSI Z87.1-1989, “American National Standard Practice for Occupational and Educational Eye and Face Protection,”.
- (2) Purchased before July 5, 1994 shall comply with the ANSI “USA standard for Occupational and Educational Eye and Face Protection,” Z87.1-1968.

Personal Protective Equipment

29 CFR 1910.134 Respiratory protection

(a) Permissible practice
- (1) Use of equipment to prevent breathing contaminated air
- (2) Respirators provided by employer when equipment is necessary
- (3) Employee shall use device in accordance with training and instructions

(b) Requirements for a minimal acceptable program
- (1) Written standard operating procedures
- (2) Respirators selected on basis of hazard
- (3) User shall receive training in proper use
- (4) Removed
- (5) Regular cleaning of unit
- (6) Storage of unit
- (7) Inspected routinely - at least once a month and after use
- (8) Appropriate surveillance or work area and degree of exposure or stress shall be maintained
- (9) Regular inspection and evaluation to determine effectiveness of program
- (10) Persons shall not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what health and physical conditions are pertinent. The respirators user's medical status should be reviewed periodically (for instance annually)
- (11) Approved or accepted respirators shall be used

(c) Selection of respirators
- (1) Proper selection according to American National Standard Practices for Respiratory Protection Z88.2-1969

(d) Air quality
- (1) Grade D breathing air
- (2) Breathing air may be supplied by cylinders or compressor
- (3) Air line couplings shall be appropriate
- (4) Breathing air containers shall be marked accordingly

(e) Use of respirators
- (1) Standard procedures shall be developed for use
- (2) Correct respirator shall be specified for each job
- (3) Written procedures shall be prepared covering safe use in dangerous atmospheres
- (4) Frequent random inspections of equipment
- (5) Proper instruction shall be provided to wearer

(f) Maintenance and care of respirators
- (1) Program for maintenance and care shall be established
- (2) Inspection procedures
- (3) Routinely used respirators shall be collected and cleaned as frequently as necessary to insure proper protection to the wearer
- (4) Replacement or repairs shall be done by experienced persons
- (5) Shall be properly stored after inspection and cleaning

(g) Identification of gas mask canisters
- (1) Properly worded labels shall be used to identify units
- (2) Those who issue units shall see that they are properly used and labeled
- (3) Units shall have proper markings
- (4) Special high-efficiency filter for protection against radionuclides shall be properly labeled
- (5) Units may only be used in atmospheres above 16% oxygen level
- (6) Each unit shall be painted a distinctive color

29 CFR 1910.135 Occupational head protection

(a) General provisions
- (1) The employer shall ensure that each affected employee wears a protective helmet when working in areas where there is a potential for injury to the head from falling objects.
- (2) The employer shall ensure that a protective helmet designed to reduce electrical shock hazard is worn by each such affected employee when near exposed electrical conductors which could contact the head.

(b) Criteria for devices
- (1) Protective helmets purchased after July 5, 1994 shall comply with ANSI Z89.1-1986, "American National Standard for Personnel Protection-Protective Headwear for Industrial Workers-Requirements".
- (2) Protective helmets purchased before July 5, 1994 shall comply with the ANSI standard "American National Standard Safety Requirements for Industrial Head Protection," ANSI Z89.1-1969.

29 CFR 1910.136 Occupational foot protection

(a) The employer shall ensure that each affected employee uses protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards.

(b) Criteria for devices
- (1) Protective footwear purchased after July 5, 1994 shall comply with ANSI Z41-1991, "American National Standard for Personal Protection-Protective Footwear".
- (2) Protective footwear purchased before July 5, 1994 shall comply with the ANSI standard "USA Standard for Men's Safety-Toe Footwear," Z41.1-1967

29 CFR 1910.137 Electrical protective devices.

This section outlines the performance criteria for electrical shock protection, in addition to minimal maintenance requirements, for Personal Protective Equipment, where applicable (i.e. gloves).

29 CFR 1910.138 Hand protection

(a) Employers shall select and require employees to use appropriate hand protection when exposed to hazards such as:
- (1) Skin absorption of harmful substances
- (2) Severe cuts and lacerations
- (3) Severe abrasions
- (4) Punctures
- (5) Chemical or thermal burns
- (6) Harmful temperature extremes

(b) Employers shall base selection on an evaluation of performance characteristics of the hand protection relative to:
- (1) Task(s) to be performed
- (2) Conditions present
- (3) Duration of use
- (4) Hazards and potential hazards identified

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Permit-Required Confined Spaces for General Industry

29 CFR 1910.146: Final Rule

(Federal Register Vol. 58 No. 9/ Thursday January 14, 1993)

The purpose of this section is to describe the recommended procedures to be followed with regard to confined spaces in industry. Also, it includes definitions of both permit and non-permit required confined spaces and the regulations that apply to each. Confined spaces are often overlooked in industry, yet they are one of the leading causes of death in today's industrial environment.

(a) Scope and application *pg 4549*

This regulation contains requirements for practices and procedures to protect employees in general industry from the hazards of entry into permit-required confined spaces. This section does not apply to agriculture, to construction, or shipyard employment.

(b) Definitions *pg 4549*

- "Acceptable entry conditions" - Conditions that must exist to allow entry
- "Attendant" - Individual stationed outside who monitors authorized entrants
- "Authorized entrant" - Employee authorized to enter a permit space
- "Blanking or binding" - Absolute closure of a pipe, line, duct, etc.
- "Confined space" - Large enough to enter, limited or restricted egress and entry, is not designed for employee occupancy
- "Double block and bleed" - Closure of line, pipe, duct, etc. and opening drain
- "Emergency" - event that may endanger occupants
- "Engulfment" - Material surrounding victim that can be aspirated and cause death by strangulation, constriction, or crushing
- "Entry" - Pass through an opening into permit-required space
- "Entry permit" - Written document provided by employer to allow and control entry
- "Entry supervisor" - Person such as foreman, crew chief, etc.
- "Hazardous atmosphere" - Atmosphere that may expose employees to risk of death, incapacitation, impairment of ability to self-rescue, or injury from causes such as:
  - Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit
  - Airborne combustible dust at a concentration that meets or exceeds its lower flammable limits
  - Atmospheric oxygen concentration below 19.5 percent or above 23.5
  - Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published
  - Any atmospheric condition that is immediately dangerous to life or health
- "Hot work permit" - A permit for welding, cutting, etc.
- "Immediately dangerous to life and health" - Any condition that poses an immediate or delayed threat to life
- "Inerting" - Means the displacement of the atmosphere with a noncombustible gas
- "Isolation" - Completely removed and protected against the release of energy
- "Oxygen deficient atmosphere" - Oxygen level below 19.5 percent
- "Permit required space" - Space that contains a hazardous atmosphere, material that has the potential for engulfment, or has internal configuration that may trap an individual such as inwardly converging walls
- "Prohibited condition" - Any condition in a permit space not allowed during an entry
- "Rescue service" - The personnel designated to rescue employees from permit spaces
- "Retrieval system" - Equipment to lift persons from a permit space
- "Testing" - Process by which hazards are identified and evaluated

Permit-Required Confined Spaces

(c) General requirements *pg 4551*

(1) The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces.
(2) If permit area is determined, the employer shall inform exposed employees.
(3) If the employer deems there will be no entry, take measures to prohibit entry.
(4) If the employer deems entry is appropriate, develop written plan.
(5) An employer may use specified alternate procedures to enter area.
(6) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.
(7) A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under specific procedures.
(8) When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall inform the contractor of permit spaces, apprise the contractor of the elements, that make it a permit space,apprise the contractor of any precautions, coordinate entry operations with contractor and debrief contractor.
(9) In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall obtain available information about permit space hazards, coordinate entry operations, and inform host employer of permit space program contractor will follow.

(**d) Permit space program**

(1) Implement the measures necessary to prevent unauthorized entry.
(2) Identify and evaluate the hazards of permit spaces before employees enter them.
(3) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations.
(4) Provide the following equipment at no cost to employees, maintain that equipment properly, and ensure that employees use that equipment properly.
(5) Evaluate permit space conditions using specified procedures when entry operations are conducted.
(6) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations.
(7) If multiple spaces are to be monitored by a single attendant, include procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces.
(8) Designate the persons who are to have active roles in entry operations, identify the duties of each such employee, and provide each such employee with the appropriate training.
(9) Develop and implement procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue.
(10) Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this section.
(11) Develop and implement procedures to coordinate entry operations when employees of more than one employer are working simultaneously as authorized entrants in a permit space.
(12) Develop and implement procedures necessary for concluding the entry after entry operations have been completed.
(13) Review and revise entry operations when the employer has reason to believe that the measures taken under the permit space program may not protect employees.
(14) Review the permit space program, using the canceled permits within 1 year after each entry and revise the program as necessary, to ensure that employees participating in entry operations are protected from permit space hazards.

(e) Permit system

(1) Before entry is authorized, the employer shall document the completion of measures by preparing an entry permit.
(2) Before entry begins, entry supervisor identified must sign the entry permit to authorize entry.
(3) The completed permit shall be posted at the entry portal or by any other equally effective means.
(4) The duration of the permit may not exceed the time required to complete the assigned task on the permit.
(5) The entry supervisor shall terminate entry and cancel the entry permit when entry operations have been completed, or a condition that is not allowed arises.
(6) The employer shall retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program

(f) Entry permit

The entry permit that documents compliance with this section and authorizes entry to a permit space shall identify:

(1) The permit space to be entered;
(2) The purpose of the entry;
(3) The date and the authorized duration of the entry permit;
(4) The authorized entrants within the permit space, by name or by such other means as will enable the attendant to determine quickly and accurately, for the duration of the permit;
(5) The personnel, by name, currently serving as attendants;
(6) The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;
(7) The hazards of the permit space to be entered;
(8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;
(9) The acceptable entry conditions;
(10) The results of initial and periodic tests accompanied by the names or initials of the testers and by an indication of when the tests were performed;
(11) The rescue and emergency services that can be summoned and the means for summoning those services;
(12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;
(13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;
(14) Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and
(15) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

(g) Training

(1) The employer shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned..
(2) Training shall be provided to each affected employee before the employee is first assigned, before these is a change in assigned suties, when there is a change in permit space operations and whenever the employer has reason to believe there are deviations for permit entry procedures.
(3) The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary.
(4) The employer shall certify that the training required has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and the authorized representatives.

(h) Duties of authorized entrants

The employer shall ensure that all authorized entrants:

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
(2) Properly use equipment;
(3) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space;
(4) Alert the attendant whenever the entrant recognizes warning sign or symptom of exposure to a dangerous situation, or detects a prohibited condition; and
(5) Exit from the permit space as quickly as possible whenever an order to evacuate is given, the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, the entrant detects a prohibited condition, or an evacuation alarm is activated.

(i) Duties of attendants

The employer shall ensure that each attendant:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
(2) Is aware of possible behavioral effects of hazard exposure in authorized entrants;
(3) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants accurately identifies who is in the permit space;
(4) Remains outside the permit space during entry operations until relieved by another attendant;
(5) Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space;
(6) Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under certain conditions;
(7) Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;
(8) Takes actions when unauthorized persons approach or enter a permit space while entry is underway to warn unauthorized person of hazards, advise unauthorized person to exit, and inform authorized entrants and supervisor if unauthorized persons have entered;
(9) Performs non-entry rescues as specified by the employer's rescue procedure; and
(10) Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

(j) Duties of entry supervisors

The employer shall ensure that each entry supervisor:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
(2) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;
(3) Terminates the entry and cancels the permit;
(4) Verifies that rescue services are available and that the means for summoning them are operable;
(5) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and
(6) Determines, whenever responsibility for a permit space entry operation is transferred, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

(k) Rescue and emergency services

(1) Employer shall ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from permit spaces, perform the assigned duties, practice making rescues at least once every 12 months, trained in basic first aid and CPR.
(2) When an employer (host employer) arranges to have persons other than the host employer's employees perform permit space rescue, the host employer shall inform rescue service of hazards they may confront, and provide rescue service with access to all permit spaces.
(3) To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.
(4) If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

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VENTILATION

Basic Field Application for Confined Space Operations

The purpose of this section is to show when and where ventilation is necessary, as well as the various types of ventilation used.

General Requirements

- Any time an area is known to be contaminated with dust or fumes (toxic or not), a ventilation system shall be installed.
- A respiratory protection program shall be established wherever it is necessary to use respiratory protection equipment. (See *Personal Protective Equipment*)

Examples of hazards to look for in the work area include:

- dust hazards from abrasive blasting
- blast cleaning enclosures
- organic abrasives which are combustible
- areas where particulate fibers are present
- dust hazards in general

Ventilation Requirements

Testing should be done in the ventilation area before any operation takes place in an area where oxygen concentration is less than 19.5% or the Lower Explosive Limit (LEL) is greater than 10%.

Types of Ventilation Systems

- Open air ventilation
- Constant air flow systems

Exhaust Systems

Fans shall be grounded in areas ventilating flammable dusts or fumes. The fan shall be approved for the particular conditions or hazard.

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BLOODBORNE DISEASES

29 CFR 1910.1030

The purpose of this section is to serve as a guide to help protect employees from exposure to blood or infectious materials in the work place. It will help employers and supervisors provide written programs and policies that will help ensure work place safety when there is a possibility of exposure to body fluids. Also, it serves as a training guideline for employees and promotes awareness of bloodborne dangers in the work place.

(a) Scope and Application

This section applies to all occupational exposure to blood or other potentially infectious materials. This section outlines those measures that can be taken to prevent or minimized exposure to bloodborne pathogens through proper planning. It also provides guidelines for the proper cleanup and disposal of those materials, including bodily fluids, that may cause disease.

(b) Definitions

- "Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, or designated representative.
- "Blood" means human blood, human blood components, and products made from human blood.
- "Bloodborne Pathogens" means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).
- "Clinical Laboratory" means a workplace where diagnostic or other screening procedures are performed on blood or other potentially infectious materials.
- "Contaminated" means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.
- "Contaminated Laundry" means laundry which has been soiled with blood or other potentially infectious materials or may contain sharps.
- "Contaminated Sharps" means any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.
- "Decontamination" means the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.
- "Director" means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designated representative.
- "Engineering Controls" means controls (e.g., sharps disposal containers, self-sheathing needles) that isolate or remove the bloodborne pathogens hazard from the workplace.
- "Exposure Incident" means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.
- "Handwashing Facilities" means a facility providing an adequate supply of running potable water, soap and single use towels or hot air drying machines.
- "Licensed Healthcare Professional" is a person whose legally permitted scope of practice allows him or her to independently perform the activities required by paragraph (f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.
- "HBV" means hepatitis B virus.
- "HIV" means human immunodeficiency virus.
- "Occupational Exposure" means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.
- "Other Potentially Infectious Materials" means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

- "Parenteral" means piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.
- "Personal Protective Equipment" is specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.
- "Production Facility" means a facility engaged in industrial-scale, large-volume or high concentration production of HIV or HBV.
- "Regulated Waste" means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.
- "Research Laboratory" means a laboratory producing or using research-laboratory-scale amounts of HIV or HBV. Research laboratories may produce high concentrations of HIV or HBV but not in the volume found in production facilities.
- "Source Individual" means any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, hospital and clinic patients; clients in institutions for the developmentally disabled; trauma victims; clients of drug and alcohol treatment facilities; residents of hospices and nursing homes; human remains; and individuals who donate or sell blood or blood components.
- "Sterilize" means the use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.
- "Universal Precautions" is an approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.
- "Work Practice Controls" means controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

(c) Exposure Control

(1) Each employer having an employee(s) with occupational exposure shall establish a written Exposure Control Plan designed to eliminate or minimize employee exposure, which includes the exposure determination, the schedule and method of implementation of the plan, and the procedure for the evaluation of circumstances. Each employer shall ensure that a copy of the Exposure Control Plan is accessible to employees in accordance with 29 CFR 1910.1020(e) and that the plan will be reviewed and updates at least annually.

(2) Each employer who has an employee(s) with occupational exposure shall prepare an exposure determination. This exposure determination shall be made without regard to the use of personal protective equipment.

(d) Methods of Compliance

(1) Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

(2) Engineering and work practice controls shall be used to eliminate or minimize employee exposure, engineering controls shall be examined and maintained, employers shall provide handwashing facilities which are readily accessible to employees or provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes, and ensure that employees wash their hands any other skin with soap and water immediately.

- Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed.
- Shearing or breaking of contaminated needles is prohibited.
- Immediately or as soon as possible after use, contaminated reusable sharps shall be placed in appropriate containers until properly reprocessed.
- Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure.
- Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.
- All procedures involving blood or other potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets of these substances.
- Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.

- Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.
- Equipment which may become contaminated with blood or other potentially infectious materials shall be examined prior to servicing or shipping and shall be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible.

(3) When there is occupational exposure, the employer shall provide, at no cost to the employee, and ensure employee uses appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices.

(4) Employers shall ensure that the worksite is maintained in a clean and sanitary condition. The employer shall determine and implement an appropriate written schedule for cleaning and method of decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area.

(e) HIV and HBV Research Laboratories and Production Facilities

(1) This paragraph applies to research laboratories and production facilities engaged in the culture, production, concentration, experimentation, and manipulation of HIV and HBV. It does not apply to clinical or diagnostic laboratories engaged solely in the analysis of blood, tissues, or organs. These requirements apply in addition to the other requirements of the standard.

(2) Research laboratories and production facilities shall meet a specified criteria, including but not limited to, incinerating or decontaminating all regulated waste, keeping lab doors closed when working with HIV or HBV, placing all contaminated materials in a durable, leakproof, labeled or color-coded container, limiting to authorized persons, posting hazard warning signs, conducting activities in biological safety cabinets that involve potentially infectious materials, and wearing appropriate protective clothing. Certified biological safety cabinets (Class I, II, or III) or other appropriate combinations of personal protection or physical containment devices shall be used for all activities with other potentially infectious materials.

(3) HIV and HBV research laboratories shall meet the specified criteria, including each laboratory shall contain a facility for hand washing and an eye wash facility which is readily available within the work area, and an autoclave for decontamination of regulated waste shall be available.

(4) HIV and HBV production facilities shall meet the specified criteria, including work areas shall be separated from areas that are open to unrestricted traffic flow within the building, work area shall be water resistant, sink for hand washing shall be provided, access doors shall be self- closing, an autoclave shall be available within or near work area, and a ducted exhaust-air ventilation system shall be provided.

(f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up

(1) The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident and shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are made available and conducted at no cost to the employee by an accredited laboratory, provided at a reasonable time and place, performed by or under the supervision of a licensed physician or under the supervision of another licensed healthcare professional, and provided according to recommendations of the U.S. Public Health Service current at the time these evaluations.

(2) Hepatitis B vaccination shall be made available after the employee has received the training required in and within 10 working days of initial assignment to all employees who have occupational exposure unless the employee has previously received the complete hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons.

(3) Post-exposure Evaluation and Follow-up. Following a report of an exposure incident, the employer shall make immediately available to the exposed employee a confidential medical evaluation and follow-up, including documentation of the route(s) of exposure, and the circumstances under which the exposure incident occurred, identification and documentation of the source individual, unless the employer can establish that identification is infeasible or prohibited by state or local law; collection and testing of blood for HBV and HIV serological status, post-exposure prophylaxis, when medically indicated, counseling, and an evaluation of reported illnesses.

(4) The employer shall ensure that the healthcare professional responsible for the employee's Hepatitis B vaccination is provided a copy of this regulation and ensure that the healthcare professional evaluating an employee after an exposure incident is provided with a copy of this regulation, a description of the exposed employee's duties as they relate to the exposure incident, documentation of the route(s) of exposure and circumstances under which exposure occurred, results of the source individual's blood testing, if available, and all medical records relevant to the appropriate treatment of the employee including vaccination status which are the employer's responsibility to maintain.
(5) The employer shall obtain and provide the employee with a copy of the evaluating healthcare professional's written opinion within 15 days of the completion of the evaluation.
(6) Medical records required by this standard shall be maintained.

(g) Communication of Hazards to Employees

(1) Warning labels shall be affixed to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious material; and other containers used to store, transport or ship blood or other potentially infectious materials. Labels required by this section shall include a legend, shall be fluorescent orange or orange-red or predominantly so, with lettering and symbols in a contrasting color, shall be affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal.
(2) Employers shall ensure that all employees with occupational exposure participate in a training program which must be provided at no cost to the employee and during working hours.

(h) Recordkeeping

(1) The employer shall establish and maintain an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.1020, including employee name and social security number, a copy of the hepatitis B vaccination status, a copy of all results of examinations, medical testing, and follow-up procedures, a copy of the healthcare professionals written opinion, and a copy of information provided to the healthcare professional. The employer shall ensure that employee medical records kept confidential, and not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.
(2) Training records shall include the following information: the dates of the training sessions; the contents or a summary of the training sessions; the names and qualifications of persons conducting the training; and the names and job titles of all persons attending the training sessions. Records shall be maintained for 3 years from the date on which the training occurred.
(3) The employer shall ensure that all records required to be maintained by this section shall be made available upon request to the Assistant Secretary and the Director, employees, to employee representatives, to the Director, and to the Assistant Secretary, and the subject employee for examination and copying.
(4) The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h). If the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director, at least three months prior to their disposal and transmit them to the Director, if required by the Director to do so, within that three month period.

(i) Effective Dates

(1) The standard shall become effective on March 6, 1992.
(2) The Exposure Control Plan shall be completed on or before May 5, 1992.
(3) Information and Training and Recordkeeping shall take effect on or before June 4, 1992.
(4) Engineering and Work Practice Controls, Personal Protective Equipment, Housekeeping, HIV and HBV Research Laboratories and Production Facilities, Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, and Labels and Signs, shall take effect July 6, 1992.

LOCKOUT / TAGOUT
29 CFR 1910.147

(a) Scope, application and purpose

This standard covers the servicing and maintenance of machines and equipment in which the "unexpected" energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy. This standard applies to the control of energy during servicing and/or maintenance of machines and equipment. This section requires employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees.

(b) Definitions applicable to this section

- "Affected employee." An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- "Authorized employee." A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.
- "Capable of being locked out." An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.
- "Energized." Connected to an energy source or containing residual or stored energy.
- "Energy isolating device." A mechanical device that physically prevents the transmission or release or energy, including but not limited to the following: A manually operated electrical circuit breaker, a disconnect switch, a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.
- "Energy source." Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- "Hot tap." A procedure used in the repair maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.
- "Lockout." The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- "Lockout device." A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
- "Normal production operations." The utilization of a machine or equipment to perform its intended production function.

- "Servicing and/or maintenance." Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or un-jamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or start-up of the equipment or release of hazardous energy.
- "Setting up." Any work performed to prepare a machine or equipment to perform its normal production operation.
- "Tagout." The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- "Tagout device." A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

(c) General Requirements

(1) The employer shall establish a program consisting of energy control procedures, employee training and to periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start-up or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

(2) If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph shall utilize a tagout system, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection. After January 2, 1990, whenever replacement or major repair of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designed to accept a lockout device.

(3) When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program and demonstrate full compliance with all tagout-related provisions

(4) Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section. The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance.

(5) Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources. Lockout devices and tagout devices shall be singularly identified; shall be the only device(s) used for controlling energy; shall not be used for other purposes; and shall meet the specific requirements of durability, standardization, substantialness, and identifiability.

(6) The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

(7) The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include authorized employees receiving training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control, affected employees being instructed in the purpose and use of the energy control procedure, employees being instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out, and limitations of tags. The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

(8) Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.
(9) Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

(d) Application of control

The established procedures for the application of energy control (the lockout or tagout procedures) shall cover the following elements and actions and shall be done in the following sequence:

(1) Preparation for shutdown - Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.
(2) Machine or equipment shutdown- The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.
(3) Machine or equipment isolation - All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).
(4) Lockout or tagout device application - (1) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees. (2) Lockout devices, where used, shall be affixed in a manner to that will hold the energy isolating devices in a “safe” or “off” position. (3) Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the “safe” or “off” position is prohibited.
(5) Stored energy - (1) Following the application of logout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe. (2) If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.
(6) Verification of isolation - Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished.

(e) Release from lockout or tagout

Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

(1) The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.
(2) The work area shall be checked to ensure that all employees have been safely positioned or removed. Before and after lockout or tagout devices are removed and before machines or equipment are energized, affected employees shall be notified that the lockout or tagout devices have been removed.
(3) Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer’s energy control program. The employer shall demonstrate that the specific procedure shall include verification by the employer that the authorized employee who applied the device is not at the facility, making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

(f) Additional requirements

(1) In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, in the following sequence of actions: (1) Clear the machine or equipment of tools and materials; (2) Remove employees from the machine or equipment area; (3) Remove the lockout or tagout devices; of this section; (4) Energize and proceed with testing or positioning; (5) Deenergize all systems and reapply energy control measures to continue the servicing and/or maintenance.

(2) Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures and shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

(3) When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

(4) Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.

HAZARD COMMUNICATION STANDARD
WORKER RIGHT-TO-KNOW (RTK)

29 CFR 1910.1200

(a) Purpose

The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

(b) Scope and application

This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency, to laboratories with certain exceptions, and to work operations where employees only handle chemicals in sealed containers.

(c) Definitions

- "Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.
- "Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.
- "Chemical" means any element, chemical compound or mixture of elements and/or compounds.
- "Chemical manufacturer" means an employer with a workplace where chemical(s) are produced for use or distribution.
- "Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.
- "Combustible liquid" means any liquid having a flashpoint at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flashpoints of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
- "Commercial account" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.
- "Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.
- "Compressed gas" means: (i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or (ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) regardless of the pressure at 70 deg. F (21.1 deg.C); or (iii) A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 deg. C) as determined by ASTM D-323-72.
- "Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.
- "Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.
- "Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.
- "Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.
- "Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.
- "Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.
- "Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.
- "Exposure or exposed" means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure.

- "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)
- "Flammable" means a chemical that falls into one of the following categories:
  - (i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;
  - (ii) "Gas, flammable" means: (A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or (B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;
  - (iii) "Liquid, flammable" means any liquid having a flashpoint below 100 deg. F (37.8 deg. C), except any mixture having components with flashpoints of 100 deg. F (37.8 deg. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.
  - (iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.
- "Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows: (i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 deg. F (37.8 deg. C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or (ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 deg. F (37.8 deg. C), or that contain suspended solids, or that have a tendency to form a surface film under test; or (iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)). Organic peroxides, which undergo auto-accelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.
- "Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.
- "Hazardous chemical" means any chemical which is a physical hazard or a health hazard.
- "Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for "physical hazard" and "health hazard" to determine the hazards which must be covered.)
- "Health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.
- "Identity" means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.
- "Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
- "Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.
- "Label" means any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.
- "Material safety data sheet (MSDS)" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.
- "Mixture" means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.
- "Organic peroxide" means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.
- "Oxidizer" means a chemical other than a blasting agent or explosive as defined in 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.
- "Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.
- "Produce" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.
- "Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130 deg. F (54.4 deg. C) or below.

- "Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- "Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.
- "Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.
- "Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.
- "Use" means to package, handle, react, emit, extract, generate as a by-product, or transfer.
- "Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
- "Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.
- "Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

(d) Hazard determination

(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose not to rely on the evaluation performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(2) Chemical manufacturers, importers or employers evaluating chemicals shall identify and consider the available scientific evidence concerning such hazards. For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section.

(3) The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous: (i) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or, (ii) "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.

(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes: (i) National Toxicology Program (NTP), "Annual Report on Carcinogens" (latest edition); (ii) International Agency for Research on Cancer (IARC) "Monographs" (latest editions); or (iii) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

(5) The chemical manufacturer, importer or employer shall determine the hazards of mixing chemicals.

(6) Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate, to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director.

(e) Written hazard communication program

(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified for labels and other forms of warning, material safety data sheets, and employee information and training will be met, including a list of the hazardous chemicals known to be present, and the methods the employer will use to inform employees of the hazards of non-routine tasks and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(2) Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed shall additionally ensure that the hazard communication programs developed and implemented include the methods the employer will use to provide the other employer(s) on-site access to material safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working; the methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and, the methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(3) The employer may rely on an existing hazard communication program to comply with these requirements.

(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

(5) Where employees must travel between workplaces during a workshift, the written hazard communication program may be kept at the primary workplace facility.

(f) Labels and other forms of warning

(1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the identity of the hazardous chemical(s), the appropriate hazard warnings, and the name and address of the chemical manufacturer, importer, or other responsible party.
(2) For solid metal, solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes. The label may be transmitted with the initial shipment itself, or with the material safety data sheet that is to be provided prior to or at the time of the first shipment.
(3) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.
(4) If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard.
(5) The employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information, expect as otherwise provided: (i) Identity of the hazardous chemical(s) contained therein; and, (ii) Appropriate hazard warnings, or alternatively, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.
(6) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information.
(7) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer.
(8) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.
(9) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift.
(10) The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.
(11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within three months of becoming aware of the new information.

(g) Material safety data sheets

(1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet in the workplace for each hazardous chemical which they use.
(2) Each material safety data sheet shall be in English, and shall contain the following information: the identity used on the label, and on trade secrets, physical and chemical characteristics of the hazardous chemical, physical hazards of the hazardous chemical, health hazards of the hazardous chemical, the primary route(s) of entry, the OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available, whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition), any generally applicable precautions for safe handling and use, any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, emergency and first aid procedures, the date of preparation of the material safety data sheet or the last change to it; and, the name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
(3) If no relevant information is found for any given category on the material safety data sheet, the chemical manufacturer, importer or employer preparing the material safety data sheet shall mark it to indicate that no applicable information was found.
(4) Where complex mixtures have similar hazards and contents, the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.
(5) The chemical manufacturer, importer or employer preparing the material safety data sheet shall ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination.
(6) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety data sheet is updated and either provide material safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment.
(7) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a material safety data sheet is updated. The distributor shall either provide material safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment; Wholesale distributors shall also provide material safety data sheets to employers or other distributors upon request.

(8) The employer shall maintain in the workplace copies of the required material safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).
(9) Where employees must travel between workplaces during a workshift, the material safety data sheets may be kept at the primary workplace facility.
(10) Material safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals.
(11) Material safety data sheets shall also be made readily available, upon request, to designated representatives and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.1020(e). The Director shall also be given access to material safety data sheets in the same manner.

(h) Employee information and training

(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets.
(2) Employees shall be informed of: the requirements of this section, any operations in their work area where hazardous chemicals are present, and, the location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.
(3) Employee training shall include: methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area, the physical and health hazards of the chemicals in the work area, the measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, and the details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

(i) Trade secrets

(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical, from the material safety data sheet, provided that the claim that the information withheld is a trade secret can be supported, information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed, the material safety data sheet indicates that the specific chemical identity is being withheld as a trade secret, and, the specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph.
(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement.
(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld, to a health professional providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, under specific conditions.
(4) The confidentiality agreement may restrict the use of the information to the health purposes indicated in the written statement of need, may provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages, and, may not include requirements for the posting of a penalty bond.
(5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.
(6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.
(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must be provided to the health professional, employee, or designated representative, within thirty days of the request, be in writing, include evidence to support the claim that the specific chemical identity is a trade secret, state the specific reasons why the request is being denied, and, explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.
(8) The health professional, employee, or designated representative whose request for information is denied may refer the request and the written denial of the request to OSHA for consideration.
(9) When a health professional, employee, or designated representative refers the denial to OSHA, OSHA shall consider the evidence to determine if: the chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret, the health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information, and, the health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

(10) If OSHA determines that the specific chemical identity requested is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA. If the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations upon the disclosure.

(11) If a citation for a failure to release specific chemical identity information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure.

(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

(j) Effective dates

Chemical manufacturers, importers, distributors, and employers shall be in compliance with all provisions of this section by March 11, 1994.

Joint Commission on Accreditation of Healthcare Organizations

Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is the primary standard setting body for the health care industry. The standards published by JCAHO reflect the work of many advisory groups from private, state and federal sectors, representing the expertise in the delivery of healthcare. The standards are a minimum benchmark for healthcare organizations to achieve in order to become accredited by JCAHO. The cornerstone of this process is *The Comprehensive Accreditation Manual for Hospitals: The Official Handbook (CAMH).* This manual is updated on a quarterly basis to reflect the most current accreditation information and updated standards. The latest version is effective January 1, 1997 with the next update due in May, 1997. The manual is divided into fifteen sections containing 578 individual standards relating to all phases of hospital organization and operations. The sections are:

> Patient Rights and Organizational Ethics (RI Standards)
> Assessment of Patients (PE Standards)
> Care of Patients (TX Standards)
> Education (PF Standards)
> Continuum of Care (CC Standards)
> Improving Organization Performance (PI Standards)
> Leadership (LD Standards)
> Management of the Environment of Care (EC Standards)
> Management of Human Resources (HR Standard)
> Management of Information (IM Standards)
> Surveillance, Prevention and Control of Infection (IC Standards)
> Governance (GO Standards)
> Management (MA Standards)
> Medical Staff (MS Standards)
> Nursing (NR Standards)

In addition to the listed sections, the manual illustrates a detail outline of the accreditation process including the general intent of each standard along with the scoring and aggregation rules for each section.

This process is extremely important to hospitals as JCAHO accreditation is a requirement in most states for hospital licensure, Medicare/Medicaid funding and insurance payments.

The Joint Commission also publishes a manual entitled *Guidelines for the Design and Construction of Hospital and Health Care Facilities*. This document provides guidelines to providers, designers and construction organizations in the building of health care facilities.

For additional information on these publications and/or standards contact:
Joint Commission on Accreditation of Healthcare Organizations
One Renaissance Boulevard
Oakbrook Terrace, IL 60181-9887 Phone: (630) 792-5800

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Process Safety Management of Highly Hazardous Chemicals
29 CFR 1910.119

This section contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. These releases may result in toxic, fire or explosion hazards.

(a) Application

(b) Definitions

- "Atmospheric tank" means a storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (pounds per square inch gauge, 3.45 Kpa).
- "Boiling point" means the boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) (760 mm.). For the purposes of this section, where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, the 10 percent point of a distillation performed in accordance with the Standard Method of Test for Distillation of Petroleum Products, ASTM D-86-62, which is incorporated by reference as specified in Sec. 1910.6, may be used as the boiling point of the liquid.
- "Catastrophic release" means a major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals, that presents serious danger to employees in the workplace.
- "Facility" means the buildings, containers or equipment which contain a process.
- "Highly hazardous chemical" means a substance possessing toxic, reactive, flammable, or explosive properties and specified by paragraph (a)(1) of this section.
- "Hot work" means work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.
- "Normally unoccupied remote facility" means a facility which is operated, maintained or serviced by employees who visit the facility only periodically to check its operation and to perform necessary operating or maintenance tasks. No employees are permanently stationed at the facility. Facilities meeting this definition are not contiguous with, and must be geographically remote from all other buildings, processes or persons.
- "Process" means any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purposes of this definition, any group of vessels which are interconnected and separate vessels which are located such that a highly hazardous chemical could be involved in a potential release shall be considered a single process.
- "Replacement in kind" means a replacement which satisfies the design specification.
- "Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D contained in 1910.1200 sets out the criteria to be used in evaluating trade secrets.

(c) Employee participation

(1) Employers shall develop a written plan of action regarding the implementation of the employee participation required by this paragraph.
(2) Employers shall consult with employees and their representatives on the conduct and development of process hazards analyses and on the development of the other elements of process safety management in this standard.
(3) Employers shall provide to employees and their representatives access to process hazard analyses and to all other information required to be developed under this standard.

(d)(1)(i) through (d)(2)(i)(E) Process safety information. The employer shall complete a compilation of written process safety information to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals.

(d)(2)(ii) Where the original technical information no longer exists, such information may be developed in conjunction with the process hazard analysis in sufficient detail to support the analysis.

(d)(3)(i)(A) through (d)(3)(i)(H) These paragraphs outline the required information regarding the equipment to be used in the applicable processes.

(d)(3)(ii) The employer shall document that equipment complies with recognized and generally accepted good engineering practices.

(d)(3)(iii) For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, the employer shall determine and document that the equipment is designed, maintained, inspected, tested, and operating in a safe manner.

(e)(1) Process hazard analysis shall be completed according to the following schedule:

(i) No less than 25 percent of the initial process hazards analyses shall be completed by May 26, 1994;
(ii) No less than 50 percent of the initial process hazards analyses shall be completed by May 26, 1995;
(iii) No less than 75 percent of the initial process hazards analyses shall be completed by May 26, 1996;
(iv) All initial process hazards analyses shall be completed by May 26, 1997.
(v) Process hazards analyses completed after May 26, 1987 which meet the requirements of this paragraph are acceptable as initial process hazards analyses. These process hazard analyses shall be updated and revalidated, based on their completion date, in accordance with paragraph (e)(6) of this standard.

(e)(2)(i) through (e)(5) These paragraphs outline the choice of methodologies of the hazards analyses, the items that the analyses must address, who should conduct the analyses, and the requirement to establish a system to address, implement and document the findings/recommendations resulting from the analyses.

(e)(6) through (e)(7) At least every five (5) years after the completion of the initial process hazard analysis, the process hazard analysis shall be updated and revalidated. Employers shall retain process hazards analyses and updates or revalidation's for each process covered by this paragraph for the life of the process.

(f)(1)(i)(A) through (f)(1)(iii)(C) These paragraphs cover the requirement to document normal and emergency operating procedures as well as precautions to avoid or minimize physical contact with the process' chemicals.

(f)(1)(iii)(D) & (E) Quality control for raw materials and control of hazardous chemical inventory levels and any special or unique hazards.

(f)(1)(iv) Safety systems and their functions.

(f)(2) Operating procedures shall be readily accessible to employees who work in or maintain a process.

(f)(3) The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice. The employer shall certify annually that these operating procedures are current and accurate.

(f)(4) The employer shall develop and implement safe work practices to provide for the control of hazards during operations. These safe work practices shall apply to employees and contractor employees.

(g)(1)(i) through (g)(3) Outlines the training required of employees and contractors and the documentation required.

(h)(1) through (h)(3)(v) These paragraphs are requirements that apply to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process only.

(i)(1) through (i)(2)(iv) The employer shall perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information. These paragraphs discuss the required elements of the pre-startup safety review.

(j)(1)(i) through (j)(j)(6)(iii) These paragraphs detail the requirements of the employer to assure and document the continued mechanical integrity of the equipment used in covered processes.

(k)(1) through (k)(2) Outline the requirements for Hot Work Permits on covered processes.

(l)(1) through (l)(5) These paragraphs outline the management of changes within the covered processes.

(m)(1) through (m)(7) These paragraphs outline the requirements and procedures for incident investigation. The employer shall investigate each incident which resulted in, or could reasonably have resulted in a catastrophic release of highly hazardous chemical in the workplace. Incident investigation reports shall be retained for five years.

(n) Emergency planning and response. The employer shall establish and implement an emergency action plan for the entire plant in accordance with the provisions of 29 CFR 1910.38(a). In addition, the emergency action plan shall include procedures for handling small releases. Employers covered under this standard may also be subject to the hazardous waste and emergency response provisions contained in 29 CFR 1910.120(a), (p) and (q).

(o)(1) through (o)(5) Compliance Audits must be conducted by the employer at least every 3 years. Employers shall retain the two (2) most recent compliance audit reports.

(p)(1) through (p)(3) ...Trade secrets...Employers shall make all information necessary to comply with the paragraph available to those persons responsible for compiling the process safety information, those assisting in the development of the process hazard analysis, those responsible for developing the operating, and those involved in incident investigations, emergency planning and response and compliance audits without regard to possible trade secret status of such information. Nothing shall preclude the employer from requiring the persons to whom the information is made to enter into confidentiality agreements not to disclose the information. Employees and their designated representatives shall have access to trade secret information contained within the process hazard analysis and other documents required to be developed by this standard.

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Hazardous Materials Incident Response Curriculum Guidelines

About the Response Guidelines

The Hazardous Materials Incident Response Curriculum Guidelines (Response Guidelines) are provided to assist public sector training managers and employers to understand the requirements for training public sector response personnel. Existing regulatory requirements are defined, and additional recommendations are provided to help managers improve the quality and effectiveness of hazardous materials incident response training.

The Response Guidelines are organized into 14 sections. The first section addresses general response training issues and includes:

- Employer's legal responsibilities for training
- The challenge of training to competency
- Response competency definitions
- General methodology and testing considerations
- Refresher training
- Instructor qualifications

Sections 2 through 14 display the objectives to be addressed in training and achieved by public sector response trainees for each competency area or response role that a public sector employee may be required to perform during a hazardous materials incident. The competency area sections are:

- First Responder Awareness
- First Responder Operations
- Hazardous Materials Technician
- On-Scene Incident Commander
- Hazardous Materials Branch Officer
- Safety Officer at Hazardous Materials Incidents
- OSHA: Specialist and NFPA: Specialist Employee A and Technician Specialties
- OSHA: Specialist Employee and NFPA: Specialist Employees B,C
- Emergency Medical Services Level 1
- Emergency Medical Services Level 2
- Hospital Personnel
- Special Topics
- Related Standards

In each of these competency area sections, the minimum level of *required training* is defined by the specifications from OSHA 1910.120(q). In addition, a more extensive *recommended* level of training is defined primarily by the specifications from NFPA 472 and NFPA 473.

Additional training objectives have been added to the recommended level of training beyond those specified in NFPA 472 to address special topics such as radiological first responder, cleanup considerations, and skilled support personnel. Each topic and the rationale for the additional training objectives are discussed in the Special Topics section.

For all *recommended* training objectives in each competency area section, the source and relationship training *required* under OSHA 1910.120(q) are given. The relationship of *recommended* objectives to regulatory requirements is provided to assist in assessing courses for compliance.

Directions for using this material to assess courses and support overall planning of training programs are provided in the Guidelines for Hazardous Materials Program Management section.

Hazardous Materials

Incident Response

General Training Issues

General Training Issues

The Need to Train

Public sector employees who respond to hazardous materials emergencies must be properly trained to perform their jobs safely and efficiently. Their employers are responsible for ensuring the health and safety of the responding personnel as well as the protection of the public and the communities served.

Public sector training managers face a significant challenge in ensuring that all responding personnel are fully trained and prepared, while working within existing limited resources and conflicting priorities. Their challenge is compounded by many other factors that affect the competency of public sector personnel to respond. These factors include individual retention differences and various needs for refresher training; the changing and complex nature of the hazardous materials threat; evolving incident strategies and operational techniques; and unpredictable team, expertise, and resource combinations during incident response.

Employer's Legal Responsibilities

OSHA 29 CFR 1910.120(q) and EPA 40 CFR 311 (EPA 311) require that emergency response employees be completely trained before they perform in emergencies. At a minimum, such training should include the elements of the emergency response plan, standard operating procedure (SOP's) established by the employer, and procedures for notification and handling of emergency incidents.

The employer must certify annually that each employee has successfully completed the required training. The method used to demonstrate competency for certification of training must be recorded and maintained by the employer. Important concepts to remember are:

- The chief or director is responsible for determining the appropriate level of training required based on actions required of members as stated in the SOP's.
- The chief or director is responsible for implementing the required training or certifying that members of the organization have the competencies required. Documentation of training is critical.
- OSHA 1910.120(q) rules apply to all individuals and agencies that are expected to respond to an emergency involving hazardous materials, that is, career or volunteer, fire, emergency medical services (EMS), or law enforcement personnel.

OSHA 1910.120(q) and EPA 311 apply to employers whose employees are engaged in emergency response to hazardous materials incidents. Employer responsibilities under these regulations fall into four primary areas:

- Development of an emergency response plan
- Development of specific procedures for handling hazardous materials incidents
- Training requirements
- Health and safety requirements (medical monitoring for the use of chemical protective clothing and exposure records)

Employers' Training Requirements

Employers must ensure that employees receive training in emergency response to hazardous materials incidents, based on their expected duties and functions. Such training must be performed before employees are permitted to perform in emergencies.

- An employer is responsible for determining the appropriate level of training required, based on actions expected of employees as stated in the agency's SOP's.

- An employer is responsible for implementing the required training. Emphasis should be on achieving the required competencies for the appropriate level of response rather than on minimal requirements for length of training.
- An employer is responsible for selecting qualified, competent instructors.
- An employer must provide annual refresher training sufficient to maintain competencies, or employees must demonstrate required competencies annually.
- An employer must maintain a record of demonstrated competencies including an explanation of how each competency was demonstrated. Training records must contain dates of training, student rosters, curriculum outlines, demonstration checklists or performance records and evaluation tools, and scores, if appropriate.

The Challenge of Competency

As part of a comprehensive program to protect the public and the environment from chemical incidents resulting from such occurrences as transportation accidents, spills, and discharges from industrial operations, training must be conducted for personnel who address planning, safety, response, and technical programs. Many personnel needing training related to hazardous materials are volunteers or part-time employees. Maintaining minimum competency levels for full-time paid staff may be difficult, but training part-time or volunteer responders is an even bigger challenge. Two of the most significant challenges are determining what constitutes a minimal level and ensuring minimal requirements are met. Another challenge is presented by part-time and volunteer responders' time constraints and limited flexibility to attend training.

There continues to be a great need for awareness-level training among the target audience. There may be thousands of employees in a State who require at least awareness-level training. No single generic course can fit the needs of all elements of the target audience. Although there are basic competencies, trainers must adjust material to suit police, fire, emergency medical service (EMS), public works, transportation, sanitation employees, and so forth. Training options must be offered accordingly, given these variations of need.

OSHA has defined the *minimum* number of hours for training at operations, technician, specialist, and incident commander levels. However, each employer is responsible for employees being trained to competency, and agencies often exceed the minimum hours of training to teach and test for competencies at the levels outlined by OSHA. The training needed to reach competency depends on the preexisting skills and experience of the trainees. Agencies frequently discover that training needs exceed the minimum required hours. On the other hand, employees of a response agency who have sufficient skills and experience may require minimal time to attain the competency level desired. An effective response is based on the competency of the responders, not the number of their training hours. At a minimum, employers should evaluate the amount of learning that resulted from the instruction.

OSHA is concerned that the knowledge and skills gained during initial hazardous materials training will be lost if refresher training is not provided. OSHA realizes that it will not take as many hours to cover the information in a review as during the initial presentation; therefore, there is no hour requirement for refresher training. It is up to the employer to determine that employees maintain their original competencies through refresher training. If it is determined that employees maintain their competency without refresher training, OSHA allows them to demonstrate this annually. If the employer decides to use demonstrated competencies instead of providing training, the employer must document how each employee demonstrated competency.

Competency Definitions

First Responder Awareness Level

First responders at the awareness level are those individuals who are likely to witness or discover a release of hazardous materials and are trained to initiate an emergency response sequence. No hourly training requirement is listed in either OSHA 1910.120 or NFPA 472, but these documents indicate that first responders must have sufficient training or experience to demonstrate competency in the following areas:

- An understanding of what hazardous materials are and the associated risks
- An understanding of potential outcomes when hazardous materials are present
- The ability to recognize the presence of hazardous materials
- An understanding of the first responder's role and use of the North American Emergency Response Guidebook
- The ability to recognize the need for additional resources and the knowledge of the procedures to make the appropriate notifications

First Responder Operations Level

OSHA minimum requirement = awareness + 8 hours at operations level (24 hours operations level training is required as a prerequisite to technician and/or incident commander training)

First responders at the operations level are those individuals who respond to releases or potential releases, as part of the initial response to protect people, property, and the environment. Operations-level first responders are trained to take defensive actions rather than try to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. OSHA 1910.120 requires that first responders at the operations level receive at least 8 hours of training or have sufficient experience to demonstrate competencies objectively. First responders must have the knowledge of the awareness level, and they are required to :

- Know basic hazard and risk assessment
- Know how to select and use protective equipment provided to the first responder
- Understand basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of their resources and protective equipment
- Know basic decontamination procedures
- Understand relevant SOP's and termination procedures

Hazardous Materials Technician

OSHA minimum requirement= 24 hours at operations level + technician training

Hazardous materials technicians are those who respond to releases or potential releases for the purpose of stopping the release. This level requires at least 24 hours of training at the operations level, training equal to the competencies at the technician level, and certification by the employer. Hazardous materials technicians assume a more aggressive role than first responders at the operations level. They approach the point of release to plug, patch, or otherwise stop the release of a hazardous substance. They must be trained at the first responder operations level, and they are required to:

- Know how to implement the employer's emergency response plan
- Know how to identify materials by using field survey instruments
- Be able to function in an assigned role in the incident command system
- Know how to select and use specialized personal protective equipment
- Understand hazard and risk assessment techniques
- Be able to perform advanced control and containment operations within the resources and equipment available
- Understand and implement decontamination procedures

On Scene Incident Commander

OSHA minimum requirement= 24 hours at operations level + incident commander training

Incident commanders who assume control of the incident scene beyond the first responder awareness level should receive at least 24 hours of training equal to the first responder operations level. In addition, the employer must certify that personnel in this position:

- Are able to implement the employer's incident command system
- Are able to implement the employer's emergency response plan
- Understand the risks associated with working in chemical protective clothing
- Know how to implement the local emergency response plan
- Know of the State emergency response plan and the Federal regional response team
- Understand the importance of decontamination

Hazardous Materials Branch Officer

The hazardous materials branch officer is that person who is responsible for directing and coordinating all operations assigned to the hazardous material branch by the incident commander. This function is akin to that of hazardous materials team leader and encompasses both the general command functions at the branch chief level in an incident command system and in addition includes the responsibility for technical and tactical leadership of the team of hazardous materials technicians at the incident. While the function of hazardous materials branch officer is not directly specified in OSHA 1910.120 or EPA 311, the branch officer function is a natural derivative of the incident command system requirements and incident commander delegation options which are themselves specified as required under the OSHA and EPA regulations for hazardous materials incident response. NFPA 472, Chapter 7: Competencies for Hazardous Materials Branch Officer include:

- Analyzing the incident
- Planning the response
- Implementing the response
- Reporting and documenting the hazardous materials incident

Safety Officer at Hazardous Materials Incidents and Hazardous Materials Branch Safety Officer

SAFETY OFFICER AT HAZARDOUS MATERIALS INCIDENTS

OSHA 29 CFR 1910.120(q)(3)(vii-viii) specifies certain performance and competency requirements for the safety officer at hazardous materials incidents, and employers are required to ensure that employees demonstrate competency in the skills defined. Although the safety officer was initially defined in OSHA as advising the incident commander only, subsequent OSHA interpretations acknowledge that there may be multiple safety officers at the incident scene, advising to several levels of command. OSHA competencies include:

- Identify and evaluate hazards, and assist in developing a safe response plan
- Identify and evaluate unsafe operations, activities, and/or conditions
- Identify appropriate interventions and coordinate with incident commander

HAZARDOUS MATERIALS BRANCH SAFETY OFFICER

NFPA 472, Chapter 8: Competencies for Hazardous Materials Branch Safety Officer defines the hazardous materials branch safety officer as that person who works within an incident command system (also called an incident management system) to ensure that recognized safe practices are followed within the hazardous materials branch. The hazardous materials branch safety officer will be called upon to provide technical advice or assistance regarding safety issues to the hazardous materials branch officer and incident safety officer at a hazardous materials incident. Competencies include:

- Analyzing the incident
- Assisting in developing a safe response plan
- Assisting in implementing the response plan safely
- Evaluating the response for safety problems and identifying needed interventions

OSHA: Specialist Employee/NFPA: Specialist Employee B,C

Specialist employees are defined by OSHA 1910.120(q)(5) as persons who, in the course of their regular job duties, work with and are trained in the handling of specific hazardous substances or chemical-carrying containers and are also prepared to provide advice or assistance within their area of expertise to an incident commander of the hazardous materials team at a hazardous materials incident. Advice and assistance may include gathering, recording, and analyzing information as well as guidance regarding hazards and response options. Assistance also may include working as a technical adviser in the warm and hot zones, if the specialist employee is qualified to do so safely.

These specialist functions are addressed somewhat differently in the National Fire Protection Association Standard 472, as Private Sector Specialist Employee C and Private Sector Specialist Employee B. Private Sector Specialist Employees C are persons having training or educationally acquired expertise in a product, a container, a chemical process, or some procedure of importance to the mitigation of a hazardous materials incident. Private Sector Specialist Employees C may be asked to gather, record, and analyze information. They may serve as consultants and technical advisers to the incident commander or the hazardous materials team, or they may arrange for the provision of such assistance as necessary and related to their area of expertise. They are not expected to work in either the hot or warm zones of an incident area.

Private Sector Specialist Employees B meet the competencies of Private Sector Specialist Employees C and in addition are qualified to assist the response in the warm and hot zones of an incident area and are qualified to provide information on personal protective equipment, decontamination methods, and response evaluation.

OSHA: Specialist/NFPA: Specialist Employee A and Technician Specialties

Hazardous materials specialists is a defined response competency in OSHA 29 CFR 1910.120 (q)(6)(iv) but is not a defined competency category in NFPA 472, 1997 edition. However, there is a relationship between the OSHA Specialist competency and the competencies in NFPA 472, 1997 edition, for Private Sector Specialist Employee A and the Technician Specialties: Tank Car, Cargo Tank, and Intermodal Tank. For this reason, these competencies are grouped together in these Guidelines.

HAZARDOUS MATERIALS SPECIALIST
OSHA minimum requirement = 24 hours at technician level + specialist training

Hazardous materials specialist are those senior experienced responders who respond with, and provide support to, hazardous materials technicians. Their duties parallel those of hazardous materials technicians, but specialists are required to have more direct or specific knowledge of the various substances they may be called on to contain. They also act as senior leaders of hazardous materials teams and may act as site liaisons with Federal, State, and local government authorities with regard to site activities according to OSHA 1910.120. OSHA regulations also require that specialists should receive at least 24 hours of training equal to the technician level, and they must:

- Know how to implement the local emergency response plan
- Be able to use advanced survey instruments
- Have knowledge of the State emergency response plan
- Be able to select and use proper specialized protective equipment
- Understand in-depth hazard and risk assessment techniques
- Be able to perform specialized control and containment operations with the available equipment and resources
- Be able to implement decontamination
- Be able to develop a site safety and control plan
- Understand chemical, radiological, and toxicological terminology and behavior

PRIVATE SECTOR SPECIALIST EMPLOYEE A
NFPA 472, Chapter 6—(1997 Edition)

Those persons who are specifically trained to handle incidents involving chemicals or containers for chemicals used in their organization's area of specialization. Consistent with the organization's emergency response plan and standard operating procedures, the private sector specialist employee A shall be able to analyze an incident involving chemicals within their organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

TECHNICIAN WITH A TANK CAR SPECIALTY
NFPA 472, Chapter 9—(1997 Edition)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged tank cars, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

TECHNICIAN WITH A CARGO TANK SPECIALTY
NFPA 472, Chapter 10—(1997 Edition)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged cargo tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

TECHNICIAN WITH AN INTERMODAL TANK SPECIALTY
NFPA 472, Chapter 11—(1997 Edition)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged intermodal tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

EMS/Hazardous Materials Responder

Emergency medical services personnel at EMS Hazardous Materials (HM) Level 1 are those persons who, in the course of their normal duties, may be called on to perform patient care activities in the "cold zone" at a hazardous materials incident. The incident's cold zone is the area that contains the command post and other support functions. In other documents it may be referred to as the clean zone or support zone. The role of the EMS/HM Level 1 responder is to provide care *only* to those individuals who no longer pose a significant risk of secondary contamination (that is, a risk of contaminating others, including those providing care). EMS personnel at EMS/HM Level II are those persons who, in the course of their normal duties, may be called on to perform patient care activities in the "warm zone" (the area where personnel and equipment decontamination and hot zone support take place) at hazardous materials incidents. The EMS/HM Level II response personnel may provide care to individuals who still pose a significant risk of secondary contamination. In addition, personnel at this level should be able to coordinate EMS activities at a hazardous materials incident and provide medical support for hazardous materials response personnel.

EMS personnel responding to hazardous materials incidents should be trained and receive regular continuing education to maintain competency in four areas:

- Emergency medical technology
- Hazardous materials
- Special topics approved by the authority having jurisdiction
- The importance of decontamination and basic decontamination procedures

Hospital Personnel

Hospital emergency department personnel are persons who, in the course of there normal work activities, may be called upon to perform patient care and decontamination within the confines of the hospital. These personnel in the performance of their duties may be exposed to a significant risk of secondary contamination from the patients which they are charged to care for. In addition these personnel may be called upon to assist pre-hospital personnel requiring technical assistance in the area of patient decontamination.

Refresher Training

OSHA minimum requirement = annual refresher training or recertification for all levels

All public sector employees who may respond to hazardous materials emergencies must receive refresher training on an annual basis or have experience that ensures their competency to perform their roles safely and efficiently. Employers must certify on an annual basis that employees continue to meet the performance objectives as defined in OSHA 1910.120. This may be accomplished through refresher training or demonstration of competency.

Refresher training or competency retesting requirements vary for each of the response levels. In general, refresher training should include critical skills practice, technical information updates, and refinement of incident scene coordination through field exercises simulating emergencies. At a minimum, competency should be demonstrated in all refresher training for the skills directly affecting the safety of responding personnel. Minimum hours for annual refresher training for response personnel are not specified in OSHA 1910.120(q). However, in practice, many jurisdictions use the 8-hour minimum refresher training requirement for site workers in OSHA 1910.120(e) as a guide.

In each of the competency sections of the Response Guidelines, unique areas of emphasis for refresher training are noted.

Recommended Instructor Qualifications

OSHA 1910.120(q)(7) states: "Trainers who teach any of the above training subjects shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the U.S. National Fire Academy, or they shall have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach."

To implement the OSHA regulations and to encourage quality instruction, it is recommended that instructors possess the following:

- Job knowledge-thorough knowledge of the content to be taught; knowledge of how the information, techniques, and principles apply to performing the job; understanding the difficulties and problems that arise on the job; and specific training or education in the subject matter being taught
- Job Experience-actual work experience directly related to the subject matter (have performed that job being taught) and experience in hazardous materials incidents
- Training knowledge-successful completion of an instructor training course that covers the principles of learning, methods and sequencing of instruction, methods of testing and evaluation, preparing performance objectives and lesson plans, training liability (Reference: NFPA 1041), and oral and written communication skills
- Personal qualities-patience and understanding, enjoyment of and respect for students, and flexibility
- Sensitivity to cultural diversity among students

Some States and private organizations certify hazardous materials instructors. Professional organizations, such as NFPA, have established professional standards for instructors (NFPA 1041) that can be used to evaluate instructor training and certification. Employers and trainers should carefully examine the following criteria for certification of hazardous materials instructors.

- What standards have been applied?
- Are potential certified instructors tested in their area of subject matter expertise?
- Are candidates required to demonstrate their skills and knowledge in the classroom setting?
- Are there follow-up evaluations or rectification requirements?
- Are both instructional and technical skills addressed by certification?
- Is hands-on experience in hazardous materials response considered?
- Have the instructors performed the tasks being taught?

Hazardous Materials

Incident Response Training Guidelines

First Responder Awareness

General Training Considerations

Introduction

First responders at the awareness level shall be trained to meet all competencies of the awareness level. In addition, first responders at the awareness level shall receive training to meet requirements of the Occupational Safety and Health Administration, local occupational health and safety regulatory agencies, or Environmental Protection Agency, as appropriate for their jurisdictions. Members of any organization that respond or can be expected to respond to a hazardous materials incident must know the requirements of the OSHA 1910.120 and EPA 311 training and emergency response plan.

Definition

First responders at the awareness level are personnel who are likely to witness or discover a hazardous materials emergency or, in the course of their normal duties, may be the first persons on the scene of an emergency involving hazardous materials. First responders at the awareness level are expected to recognize that hazardous materials are present, protect themselves, call for trained personnel, and secure the area. The most important duty of these personnel is to make proper notification to begin the emergency response sequence. The first responders' role at this level should involve no potential for their exposure to the hazards related to an incident.

Audience

Hazardous materials responders at the awareness level may be employed by public- or private-sector organizations, such as fire or emergency medical services, law enforcement, emergency management, public works, public health, utilities, and transportation, as well as volunteer agencies and manufacturers, guard and security services, and contractors.

Methodology Recommendations

The training method can use a combination of lecture and media presentations with individual or small-group exercises at intervals of 30 to 45 minutes. A course can range from 4 to 16 hours in length. The exercises can consist of activities that practice identification and recognition of hazardous materials from scenario descriptions and can use information sources such as the North American Emergency Response Guidebook to establish the presence of the hazardous materials described in the scenarios.

Refresher training should focus on renewing the skill of employees in using information sources to recognize and identify hazardous materials.

Target Training to a Specific Occupational Group

Persons training for the awareness level are a diverse group, including police, fire, EMS, public works, emergency management, and transportation personnel. Although the minimal competencies for all personnel remain the same, whenever possible training should be tailored to meet the needs of specific groups. Trainees from a specific discipline or profession should be asked to respond to scenarios that are relevant to their work. They should play roles that are consistent with their occupational responsibilities. Training managers should recruit and train instructors from a variety of occupations. Training materials should depict awareness in multiple situations. Major changes to the curriculum should not be necessary; in most cases, an instructor simply must be sensitive to the audience and its needs and use realistic scenarios.

SUMMARY: First Responder at Awareness Level

Audience	*Prerequisites*	*Training*	*Refresher*

Very broad. All who may first respond to hazmat incidents.	None.	- No length required; 4-16 hours is common practice.
		- Traditional classroom format.
		- Competencies:
		  - Understanding of hazmat and the role of first responder.
		  - Ability to recognize and identify hazmat.
			Very broad. All who may first respond to hazmat incidents.

Federal Requirements
For First Responder Awareness Training

OSHA establishes the following training requirements for first responders at the awareness level. Length of training and method of testing are not specified, but employers are required to ensure the employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(i)
FIRST RESPONDER AWARENESS LEVEL

First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

(A) An understanding of what hazardous substances are, and the risks associated with them in an incident
(B) An understanding of the potential outcomes associated with an emergency created when hazardous substances are present
(C) The ability to recognize the presence of hazardous substances in an emergency
(D) The ability to identify the hazardous substance, if possible
(E) An understanding of the role the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook
(F) The ability to realize the need for additional resources, and to make appropriate notifications to the communications center.

Required Training can be translated directly into the following six sample principal objectives.

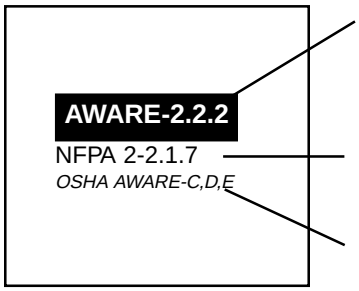
Identification	*Sample **Required** Training Objectives*
OSHA AWARE-A	Define the different types of hazardous substances and identify the risks associated with them in an incident.
OSHA AWARE-B	Given a simulated incident involving hazardous materials, identify the potential outcomes.
OSHA AWARE-C	Given the data available during an incident response, demonstrate recognition of the presence of hazardous substances.
OSHA AWARE-D	Given the data available during an incident response, identify hazardous substances present.
OSHA AWARE-E	Define the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the DOT Emergency Response Guidebook.
OSHA AWARE-F	Given a simulated incident, determine the need for additional resources, and make appropriate notifications to the communication center.

Recommended Training
For First Responder Awareness Training

The following training objectives are recommended for first responder awareness training. The primary source for this material is NFPA 472, Chapter 2: Competencies for First Responder Awareness Level. Training objectives from other sources are noted; the rationale for their inclusion is found in the Special Topics section at the end of the Response Guidelines.

In general, these objectives are comparable in scope to those minimally required by OSHA. They do not constitute an increased level of training but rather provide a greater definition of trainee objectives. To assist in assessing course compliance with OSHA 1910.120 (q), the relationships between these objectives and the OSHA requirements are noted. References to OSHA 1910.120 (q)(6)(i)(A through F) are abbreviated as OSHA AWARE-A through F.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as AWARE-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA 1910.120(q)(6)(i)(A-F) are abbreviated as AWARE-A-F.

Identification	***Recommended** Training Objectives*
AWARE-1 NFPA 2-1.3 *OSHA AWARE-C,D,E*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the first responder at the awareness level.
AWARE-1.1 NFPA 2-1.3(a) *OSHA AWARE-C,D,E*	Describe the responsibility to analyze the incident to determine both the hazardous materials present and the basic hazard and response information for each hazardous material.
AWARE-1.1.1 NFPA 2-1.3(a)1 *OSHA AWARE-C*	Identify the responsibility to detect the presence of hazardous materials
AWARE-1.1.2 NFPA 2-1.3(a)2 *OSHA AWARE-D*	Identify the responsibility to survey a hazardous materials incident from a safe location to identify the name, UN/NA identification number, or type placard applied for any hazardous materials involved
AWARE-1.1.3 NFPA 2-1.3(a)3 *OSHA AWARE-E*	Identify the responsibility to collect hazard information from the current edition of the *North American Emergency Response Guidebook*

AWARE-1.2 NFPA 2-1.3(b) *OSHA AWARE-E*	Describe the responsibility to implement actions consistent with the local emergency response plan, the organization's standard operating procedures, and the current edition of the *North American Emergency Response Guidebook* .
AWARE-1.2.1 NFPA 2-1.3(b)1 *OSHA AWARE-E*	Identify the responsibility to initiate protective actions
AWARE-1.2.2 NFPA 2-1.3(b)2 *OSHA AWARE-A,B,F*	Identify the responsibility to initiate the notification process

Analyzing the Incident
Detecting the Presence of Hazardous Materials.

AWARE-2 NFPA 2-2.1 *OSHA AWARE-A,B,C,D*	Given various facility or transportation situations, or both, with and without hazardous materials present, identify those situations where hazardous materials are present.
AWARE-2.1 NFPA 2-2.1.1 *OSHA AWARE-A*	Identify the definition of hazardous materials (or dangerous goods, in Canada).
AWARE-2.2 NFPA 2-2.1.2 *OSHA AWARE-A,E*	Identify the DOT hazard classes and divisions of hazardous materials and identify common examples of materials in each hazard class or division.
AWARE-2.3 NFPA 2-2.1.3 *OSHA AWARE-B,E*	Identify the primary hazards associated with each of the DOT hazard classes and divisions of hazardous materials by hazard class or division.
AWARE-2.4 NFPA 2-2.1.4 *OSHA AWARE-A,B*	Identify the difference between hazardous materials incidents and other emergencies.
AWARE-2.5 NFPA 2-2.1.5 *OSHA AWARE-C,D*	Identify typical occupancies and locations in the community where hazardous materials are manufactured, transported, stored, used, or disposed of.
AWARE-2.6 NFPA 2-2.1.6 *OSHA AWARE-C,D*	Identify typical container shapes that can indicate hazardous materials.
AWARE-2.7 NFPA 2-2.1.7 *OSHA AWARE-C,D,E*	Identify facility and transportation markings and colors that indicate hazardous materials, including: (a) UN/NA identification numbers; (b) NFPA 704 markings; (c) military hazardous materials markings; (d) special hazard communication markings; (e) pipeline markings; and (f) container markings.

AWARE-2.8
NFPA 2-2.1.8
OSHA AWARE-D

Given an NFPA 704 marking, describe the significance of the colors, numbers, and special symbols.

AWARE-2.9
NFPA 2-2.1.9
OSHA AWARE-D,E

Identify U.S. and Canadian placards and labels that indicate hazardous materials.

AWARE-2.10
NFPA 2-2.1.10
OSHA AWARE-B

Identify the basic information on material safety data sheets (MSDS) and shipping papers that indicates hazardous materials.

AWARE-2.10.1
NFPA 2-2.1.10.1
OSHA AWARE-B

Identify where to find material safety data sheets (MSDS).

AWARE-2.10.2
NFPA 2-2.1.10.2
OSHA AWARE-B

Identify entries on a material safety data sheet that indicate the presence of hazardous materials.

AWARE-2.10.3
NFPA 2-2.1.10.3
OSHA AWARE-B,C

Identify the entries on shipping papers that indicate the presence of hazardous materials.

AWARE-2.10.4
NFPA 2-2.1.10.4
OSHA AWARE-B,C

Match the name of the shipping papers found in transportation (air, highway, rail, and water) with the mode of transportation.

AWARE-2.10.5
NFPA 2-2.1.10.5
OSHA AWARE-B

Identify the person responsible for having the shipping papers in each mode of transportation.

AWARE-2.10.6
NFPA 2-2.1.10.6
OSHA AWARE-B

Identify where the shipping papers are found in each mode of transportation.

AWARE-2.10.7
NFPA 2-2.1.10.7
OSHA AWARE-B,C

Identify where the papers can be found in an emergency in each mode of transportation.

AWARE-2.11
NFPA 2-2.1.11
OSHA AWARE-C,E

Identify examples of clues (other than occupancy/location, container shape, markings/color, placards/labels, MSDS, and shipping papers) that use the senses of sight, sound, and odor to indicate hazardous materials.

AWARE-2.12
NFPA 2-2.1.12
OSHA AWARE-C

Describe the limitations of using the senses in determining the presence or absence of hazardous materials.

AWARE-2.13

NFPA 2-2.1.13
(See Special Topics: Terrorism)

Identify types of locations that may become targets for criminal or terrorist activity using hazardous materials.

The following are some examples of locations:

(a)Public assembly
(b)Public buildings
(c)Mass transit systems
(d)Places with high economic impact
(e)Telecommunications facilities
(f)Places with historical or symbolic significance

AWARE-2.14

NFPA 2-2.1.14
(See Special Topics: Terrorism)

Identify at least four indicators of possible criminal or terrorist activity involving hazardous materials.

The following are some examples of indicators:

(a)Hazardous materials or lab equipment that is not relevant to the occupancy
(b)Intentional release of hazardous materials
(c)Unexplained patterns of sudden onset illnesses or deaths
(d)Unusual odors or tastes
(e)Unexplained signs of skin, eye, or airway irritation
(f)Unusual security, locks, bars on windows, covered windows, and barbed wire
(g)Unexplained vapor clouds, mists, and plumes
(h)Patients twitching, tightness in chest, sweating, pin-point pupils (miosos), runny nose (rhinorrhea), and nausea and vomiting.

Analyzing the Incident

Surveying the Hazardous Materials Incident from a Safe Location

AWARE-3

NFPA 2-2.2
OSHA AWARE-D,E

Given examples of facility and transportation situations involving hazardous materials, identify the hazardous material(s) in each situation by name, UN/NA identification number, or type placard applied.

AWARE-3.1

NFPA 2-2.2.1
OSHA AWARE-D

Identify difficulties encountered in determining the specific names of hazardous materials in both facilities and transportation.

AWARE-3.2

Rad.1st Resp.
(See Special Topics)

Identify the significance of the terms “Type A,” “Type B,” and “Special Form” as they relate to radioactive material packaging.

AWARE-3.3

Rad. 1st Resp.
(See Special Topics)

Identify additional information concerning radionuclide identity and activity provided on radioactive material labels and shipping papers.

AWARE-3.4

Rad. 1st Resp.
(See Special Topics)

Identify additional information concerning physical and chemical form and packaging type provided on radioactive material shipping papers.

AWARE-3.5

NFPA 2-2.2.2
OSHA AWARE-D

Identify sources for obtaining the names of, UN/NA identification numbers for, or types of placard associated with hazardous materials in transportation.

AWARE-3.6
NFPA 2-2.2.3
OSHA AWARE-D

Identify sources for obtaining the names of hazardous materials in a facility.

Analyzing the Incident
Collecting Hazard Information

AWARE-4
NFPA 2-2.3
OSHA AWARE-A,B,E

Given the identity of various hazardous materials (name, UN/NA identification number, or type placard, identify the fire, explosion, and health hazard information for each material by using the current edition of the *North American Emergency Response Guidebook*.

AWARE-4.1
NFPA 2-2.3.1
OSHA AWARE-A,B,E

Identify the three methods for determining the appropriate guide page for a hazardous material.

AWARE-4.2
NFPA 2-2.3.2
OSHA AWARE-A,B,E

Identify the two general types of hazards found on each guide page.

AWARE-4.3
Rad. 1st Resp.
(See Special Topics)

Identify difficulties encountered in using the senses to recognize radioactive material releases and radiation.

Implementing the Response
Initiating Protective Actions

AWARE-5
NFPA 2-4.1
OSHA AWARE-E

Given examples of facility and transportation hazardous materials incidents, the local emergency response plan, the organization's standard operating procedures, and the current edition of the *North American Emergency Response Guidebook*, identify the actions to be taken to protect themselves and others and to control access to the scene.

AWARE-5.1
NFPA 2-4.1.1
OSHA AWARE-E

Identify the location of both the local emergency response plan and the organization's standard operating procedures.

AWARE-5.2
NFPA 2-4.1.2
OSHA AWARE-E,F

Identify the role of the first responder at the awareness level during a hazardous materials incident.

AWARE-5.3
NFPA 2-4.1.3
OSHA AWARE-E

Identify the basic precautions to be taken to protect themselves and others in a hazardous materials incident.

AWARE-5.3.1
Rad. 1st Resp.
(See Special Topics)

Identify circumstances involving radioactive material in transportation where actions should be initiated to protect the lives of accident victims through carrying out rescue and providing emergency medical care.

AWARE-5.3.2
NFPA 2-4.1.3.1
OSHA AWARE-E

Identify the precautions necessary when providing emergency medical care to victims of hazardous materials incidents.

AWARE-5.3.3
NFPA 2-4.1.3.2
OSHA AWARE-E

Identify typical ignition sources found at the scenes of hazardous materials incidents.

AWARE-5.3.4
NFPA 2-4.1.3.3
OSHA AWARE-A,B

Identify the ways hazardous materials are harmful to people, the environment, and property at hazardous materials incidents.

AWARE-5.3.5
NFPA 2-4.1.3.4
OSHA AWARE-A,B,C

Identify the general routes of entry for human exposure to hazardous materials.

AWARE-5.4
NFPA 2-4.1.4
OSHA AWARE-E

Given the identity of various hazardous materials (name, UN/NA identification number, or type placard), identify the following response information:
(a)Emergency action (fire, spill, or leak and first aid)
(b)Personal protective equipment necessary
(c)Initial isolation and protective action distances

AWARE-5.4.1
NFPA 2-4.1.4.1
OSHA AWARE-A,E

Given the name of a hazardous material, identify the recommended personal protective equipment from the following list:
(a)Street clothing and work uniforms
(b)Structural fire-fighting protective clothing
(c)Positive pressure self-contained breathing apparatus
(d)Chemical-protective clothing and equipment

AWARE-5.4.2
NFPA 2-4.1.4.2
OSHA AWARE-A,E

Identify the definitions for each of the following protective actions:
(a)Isolation of the hazard area and denial of entry
(b)Evacuation
(c)Sheltering in-place protection

AWARE-5.4.3
NFPA 2-4.1.4.3
OSHA AWARE-B,C,E

Identify the shapes of recommended initial isolation and protective action zones.

AWARE-5.4.4
NFPA 2-4.1.4.4
OSHA AWARE-B,C,E

Describe the difference between small and large spills as found in the table of Initial Isolation and Protective Action Distances.

AWARE-5.4.5
NFPA 2-4.1.4.5
OSHA AWARE-B,C,E

Identifying the circumstances under which the following distances are used at a hazardous materials incident:
(a)Table of initial isolation and protective action distances
(b)Isolation distances in the numbered guides

AWARE-5.4.6
NFPA 2-4.1.4.6
OSHA AWARE-B,C,E

Describe the difference between the isolation distances in the orange-bordered guide pages and the protective action distances in the green-bordered pages in the document.

AWARE-5.5
NFPA 2-4.1.5
OSHA AWARE-E

Identify the techniques used to isolate the hazard area and deny entry to unauthorized persons at hazardous materials incidents.

AWARE-5.6

NFPA 2-4.1.6
(See Special Topics: Terrorism)

Identify the specific actions necessary when an incident is suspected to involve criminal or terrorist activity.

The following are some examples of action:

(a)Communicate the suspicion during the notification process

(b)Isolate potentially exposed people

(c)Document the initial observation

(d)Attempt to preserve evidence while performing operational duties

Implementing the Response

Initiating the Notification Process

AWARE-6

NFPA 2-4.2
OSHA AWARE-E,F

Given either a facility or transportation scenario involving hazardous materials, with and without criminal or terrorist activities, identify the appropriate initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures.

Hazardous Materials

Incident Response Training Guidelines

First Responder Operations

General Training Considerations

Introduction

First responders at the operations level shall be trained to meet all requirements at the awareness and operational levels. In addition, first responders at the operations level shall receive training to meet requirements of OSHA, local occupational health and safety regulatory agencies, or EPA, as appropriate for their jurisdiction. (Source: NFPA 472)

Definition

First responders at the operations level are those persons who respond to releases or potential releases of hazardous materials as part of the initial response to the incident for the purpose of protecting nearby persons, the environment, or property from the effects of the release. They shall be trained to respond in a defensive fashion, to control the release from a safe distance and keep it from spreading. (Source: NFPA 472)

Audience

First responders at the operations level are typically those persons who are the first to arrive at the scene of a hazardous materials incident. They may be employed by law enforcement, public service, fire or emergency services, or a variety of private organizations. Generally, they are not members of a hazardous materials response team.

Methodology

First responder operations training is best conducted in a classroom environment, with opportunities for small- and large-group exercises either in the classroom or as a field exercise in conjunction with the training. Training ranges from 8 to 40 hours, and longer courses often include awareness training with the operations program. Lectures with small-group student activities are appropriate for much of the material. However, incident scene organization and command drill and practice will require large-group simulated incidents that can be best conducted in a simulator or as a field exercise.

Refresher training should include (1) competency retesting of all response skills, (2) technical information updates, and (3) critique of incident scene decision-making using simulated emergencies.

SUMMARY: First Responder at the Operations Level

OSHA minimum requirement = Awareness + 8 hours Operations training (24 hours operations training is required as a prerequisite to technician and/or incident commander training)

Audience	Prerequisites	Training	Refresher
Broad. All who may participate in initial operations at a hazmat incident.	First Responder Awareness training.	- 8-40 hours (minimum 8 required). - Classroom and simulator/field instruction. - Competencies: -Understanding of hazmat terms, basic hazard and risk assessment, and role of first responder at operational level. - Ability to perform basic control, containment and/or confinement techniques with proper use or personal protective equipment and following standard operating procedure. - Ability to implement basic decontamination procedures.	1. Competency retesting of all response skills. 2. Technical information updates. 3. Incident scene decision-making using simulated emergencies.

Federal Requirements

For First Responder Operations Training

OSHA establishes the following training requirements for first responders at the operations level: a minimum of 8 hours of training beyond the awareness level or, as an alternative, certification of sufficient experience. Training in excess of 8 hours may be necessary, especially for additional skills and knowledge such as for flammable gas firefighting. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(ii)
FIRST RESPONDER OPERATIONS LEVEL

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least 8 hours of training or have had sufficient experience to objectively demonstrate competency in the following areas, in addition to those listed for the awareness level and the employer shall so certify:

- *(A) Knowledge of the basic hazard and risk assessment techniques*
- *(B) Know how to select and use proper personal protective equipment provided to the first responder operational level*
- *(C) An understanding of basic hazardous materials terms*
- *(D) Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit*
- *(E) Know how to implement basic decontamination procedures*
- *(F) An understanding of the relevant standard operating procedures and termination procedures*

Required Training can be translated into the following six sample principal objectives.

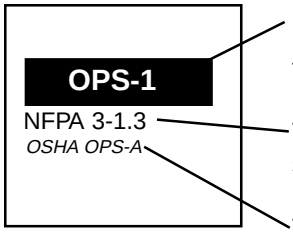
Identification	*Sample **Required** Training Objectives*
OSHA OPS-A	Given a simulated incident involving hazardous materials, demonstrate knowledge of basic hazard and risk assessment techniques.
OSHA OPS-B	Given a simulated incident involving hazardous materials, select and demonstrate correct use of proper personal protective equipment.
OSHA OPS-C	Define basic hazardous materials terms.
OSHA OPS-D	Given a simulated incident involving hazardous materials, describe basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available within the student's unit.
OSHA OPS-E	Given a simulated incident involving hazardous materials, list and define appropriate basic decontamination procedures.
OSHA OPS-F	Given a simulated incident involving hazardous materials, identify relevant SOP's and termination procedures.

Recommended Training

For First responder Operations Training

The following training objectives are recommended for first responder operations training. The primary source for this material is NFPA 472, Chapter 3: Competencies for the Responder at the Operational Level. Training objectives from other sources are so noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

The scope of training reflected in the recommended objectives exceeds those minimally required for the first responder at the operations level. The additional training recognizes the responsibility of the first responder to establish command using an incident management system at the beginning of the emergency. Therefore, several recommended objectives relate to OSHA requirements for incident commander in addition to OSHA requirements for first responder operations. To assist in assessing course compliance with OSHA 1910.120(q), the relationships between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as OPS 1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 29 CFR 1910.120(q)(6)(ii)(A-F) = OSHA OPS-A to F
OSHA 29 CFR 1910.120(q)(6)(i)(A-F) = OSHA AWARE-A to F
OSHA 29 CFR 1910.120(q)(6)(v)(A-F) = OSHA I.C.-A to F
OSHA 29 CFR 1910.120(q)(3)(i-ix) are subsumed under OSHA I.C.-A to F (see Incident Commander)

Identification	***Recommended** Training Objectives*
OPS-1 NFPA 3-1.3 *OSHA OPS-A* *OSHA AWARE-B*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the first responder at the operations level.
OPS-1.1 NFPA 3-1.3(a) *OSHA OPS-A* *OSHA AWARE-B*	Describe the responsibility to analyze a hazardous materials incident and determine the magnitude of the problem in terms of outcomes, and demonstrate the ability to do the following:
OPS-1.1.1 NFPA 3-1.3(a)1 *OSHA OPS-A* *OSHA AWARE-B*	Identify the responsibility to survey the hazardous materials incident to identify the containers and materials involved, determine whether hazardous materials have been released, and evaluate the surrounding conditions.
OPS-1.1.2 NFPA 3-1.3(a)2 *OSHA OPS-B*	Identify the responsibility to collect hazard and response information from material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and shipper/manufacturer contacts.

OPS-1.1.3 NFPA 3-1.3(a)3 *OSHA OPS-A* *OSHA AWARE-B*	Identify the responsibility to predict the likely behavior of a material as well as its container.
OPS-1.1.4 NFPA 3-1.3(a)4 *OSHA OPS-A* *OSHA AWARE-B*	Identify the responsibility to estimate the potential harm at a hazardous materials incident.
OPS-1.2 NFPA 3-1.3(b) *OSHA OPS-B,D*	Describe the responsibility to plan an initial response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
OPS-1.2.1 NFPA 3-1.3(b)1 *OSHA OPS-A*	Identify the responsibility to describe the response objectives for hazardous materials incidents.
OPS-1.2.2 NFPA 3-1.3(b)2 *OSHA OPS-D*	Identify the responsibility to describe the defensive options available for a given response objective.
OPS-1.2.3 NFPA 3-1.3(b)3 *OSHA OPS-B*	Identify the responsibility to determine whether the personal protective equipment provided is appropriate for implementing each defensive option.
OPS-1.2.4 NFPA 3-1.3(b)4 *OSHA OPS-E*	Identify the responsibility to identify the emergency decontamination procedures.
OPS-1.3 NFPA 3-1.3(c) *OSHA OPS-B,D,F* *OSHA I.C.-A,B,D*	Describe the responsibility to implement the planned response to favorably change the outcomes consistent with the local emergency response plan and the organization's standard operating procedures.
OPS-1.3.1 NFPA 3-1.3(c)1 *OSHA OPS-F* *OSHA I.C.-B,D*	Identify the responsibility to establish and enforce scene control procedures including control zones, emergency decontamination, and communications.
OPS-1.3.2 NFPA 3-1.3(c)2 *OSHA I.C.-A*	Identify the responsibility to initiate an incident management system (IMS) for hazardous materials incidents.
OPS-1.3.3 NFPA 3-1.3(c)3 *OSHA OPS-B*	Identify the responsibility to don, work in, and doff personal protective equipment provided by the authority having jurisdiction.
OPS-1.3.4 NFPA 3-1.3(c)4 *OSHA OPS-D*	Identify the responsibility to perform defensive control functions identified in the plan of action.
OPS-1.4 NFPA 3-1.3(d) *OSHA OPS-D*	Describe the responsibility to evaluate the progress of the actions taken to ensure that the response objectives are being met safely, effectively, and efficiently.

OPS-1.4.1
NFPA 3-1.3(d)1
OSHA OPS-D

Identify the responsibility to evaluate the status of the defensive actions taken in accomplishing the response objectives.

OPS-1.4.2
NFPA 3-1.3(d)2
OSHA OPS-D

Identify the responsibility to communicate the status of the planned response

Analyzing the Incident
Surveying the Hazardous Materials Incident

OPS-2
NFPA 3-2.1
OSHA OPS-A
OSHA AWARE-B

Given examples of both facility and transportation scenarios involving hazardous materials, survey the incident to identify the containers and materials involved, determine whether hazardous materials have been released, and evaluate the surrounding conditions.

OPS-2.1
NFPA 3-2.1.1
OSHA OPS-A
OSHA AWARE-C

Given three (3) examples each of liquid, gas, and solid hazardous materials, identify the general shapes of containers in which the hazardous materials are typically found.

OPS-2.1.1
NFPA 3-2.1.1.1
OSHA OPS-A
OSHA AWARE-C

Given examples of the following tank cars, identify each tank car by type:
(a)Nonpressure tank cars with and without expansion domes
(b)Pressure tank cars
(c)Cryogenic liquid tank cars

OPS-2.1.2
NFPA 3-2.1.1.2
OSHA OPS-A
OSHA AWARE-C

Given examples of the following intermodal tank containers, identify each intermodal tank container by type:
(a)Nonpressure intermodal tank containers
(b)Pressure intermodal tank containers

OPS-2.1.3
NFPA 3-2.1.1.3
OSHA OPS-A
OSHA AWARE-C

Given examples of the following cargo tanks, identify each cargo tank by type:
(a)MC-306/DOT 406 cargo tanks
(b)MC-307/DOT-407 cargo tanks
(c)MC-312/DOT-412 cargo tanks
(d)MC-331 cargo tanks
(e)MC-338 cargo tanks
(f)Dry bulk cargo tanks

OPS-2.1.4
NFPA 3-2.1.1.4
OSHA OPS-A
OSHA AWARE-C

Given examples of the following facility tanks, identify each fixed facility tank by type:
(a)Nonpressure facility tanks
(b)Pressure facility tanks
(c)Cryogenic liquid tanks

OPS-2.1.5
NFPA 3-2.1.1.5
OSHA OPS-A
OSHA AWARE-C

Given examples of the following nonbulk packages, identify each package by type:
(a)Bags
(b)Carboys
(c)Cylinders
(d)Drums

OPS-2.2
NFPA 3-2.1.2
OSHA OPS-A

Given examples of facility and transportation containers, identify the markings that differentiate one container from another.

OPS-2.2.1
NFPA 3-2.1.2.1
OSHA OPS-A

Given examples of the following marked transport vehicles and their corresponding shipping papers, identify the vehicle or tank identification marking:
(a)Rail transport vehicles, including tank cars
(b)Intermodal equipment including tank containers
(c)Highway transport vehicles, including cargo tanks

OPS-2.2.2
NFPA 3-2.1.2.2
OSHA OPS-A

Given examples of facility containers, identify the markings indicating container size, product contained, and/or site identification numbers.

OPS-2.3
NFPA 3-2.1.3
OSHA OPS-A
OSHA AWARE-E

Given examples of facility and transportation situations involving hazardous materials, identify the name(s) of the hazardous material(s) in each situation.

OPS-2.3.1
NFPA 3-2.1.3.1
OSHA OPS-A
OSHA AWARE-E

Identify the following information on a pipeline marker:
(a)Product
(b)Owner
(c)Emergency telephone number

OPS-2.3.2
NFPA 3-2.1.3.2
OSHA OPS-A
OSHA AWARE-E

Given a pesticide label, identify each of the following pieces of information; then match the piece of information to its significance in surveying the hazardous materials incident:
(a)Name of pesticide
(b)Signal word
(c)Pest control product (PCP) number (in Canada)
(d)Precautionary statement
(e)Hazard statement
(f)Active ingredient

OPS-2.4
NFPA 3-2.1.4
OSHA OPS-A

Identify and list the surrounding conditions that should be noted by the first responders when surveying hazardous materials incidents.

OPS-2.5
NFPA 3-2.1.5
OSHA OPS-A

Give examples of ways to verify information obtained from the survey of a hazardous materials incident.

OPS-2.6
NFPA 3-2.1.6
(See Special Topics: Terrorism)

Identify at least three additional hazards that could be associated with an incident involving criminal or terrorist activity.
The following are some examples of hazards:
(a)Secondary events intended to incapacitate emergency responders
(b)Armed resistance
(c)Use of weapons
(d)Booby traps
(e)Secondary contamination from handling patients
(f)Hostage barricade situations

Analyzing the Incident

Collecting Hazard and Response Information

OPS-3
NFPA 3-2.2
OSHA OPS-A

Given known hazardous materials, collect hazard and response information using material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and contacts with the shipper/manufacturer.

OPS-3.1
NFPA 3-2.2.1
OSHA OPS-A
OSHA AWARE-E

Match the definitions associated with the DOT hazard classes and divisions of hazardous materials, including refrigerated liquefied gases and cryogenic liquids, with the class or division.

OPS-3.2
NFPA 3-2.2.2
OSHA OPS-A

Identify two ways to obtain a material safety data sheet (MSDS) in an emergency.

OPS-3.3
NFPA 3-2.2.3
OSHA OPS-A,B,C,D,F
OSHA AWARE-A
OSHA I.C.-C.4

Using a material safety data sheet (MSDS) for a specified material, identify the following hazard and response information:

(a)Physical and chemical characteristics
(b)Physical hazards of the material
(c)Health hazards of the material
(d)Signs and symptoms of exposure
(e)Routes of entry
(f)Permissible exposure limits
(g)Responsible party contact
(h)Precautions for safe handling (including hygiene practices, protective measures, procedures for cleanup of spills or leaks)
(i)Applicable control measures including personal protective equipment
(j)Emergency and first aid procedures

OPS-3.4
NFPA 3-2.2.4
OSHA OPS-A
OSHA AWARE-E

Identify the following:

(a)Type of assistance provided by CHEMTREC/CANUTEC/SETIQ
(b)Procedure for contacting CHEMTREC/CANUTEC/SETIQ
(c)Information to be furnished to CHEMTREC/CANUTEC/SETIQ

OPS-3.5
NFPA 3-2.2.5
OSHA OPS-A
OSHA AWARE-E

Identify two methods of contacting the manufacturer or shipper to obtain hazard and response information.

OPS-3.6
NFPA 3-2.2.6
(See Special Topics: Terrorism)

Identify the type of assistance provided by the federal defense authorities, such as the Defense Logistics agency and the U.S. Army Operations Center, with respect to criminal or terrorist activities involving hazardous materials.

OPS-3.6.1
NFPA 3-2.2.6.1
(See Special Topics: Terrorism)

Identify the procedure for contacting federal defense authorities as specified in the local emergency response plan (ERP) or the organization's standard operating procedure (SOP).

Analyzing the Incident

Predicting the Behavior of a Material and its Container

OPS-4
NFPA 3-2.3
OSHA OPS-A

Given an incident involving a single hazardous material, predict the likely behavior of the material and its container.

OPS-4.1
NFPA 3-2.3.1
OSHA OPS-C
OSHA AWARE-E

Given two examples of scenarios involving known hazardous materials, interpret the hazard and response information obtained from the current edition of the *North American Emergency Response Guidebook*, material safety data sheets (MSDS), CHEMTREC/CANUTEC/SETIQ, and shipper/manufacturer contacts.

OPS-4.1.1
NFPA 3-2.3.1.1
OSHA OPS-C
OSHA AWARE-E

Match the following chemical and physical properties with their significance and impact on the behavior of the container and/or its contents:
(a)Boiling point
(b)Chemical reactivity
(c)Corrosivity (pH)
(d)Flammable (explosive) range (LEL & UEL)
(e)Flash point
(f)Ignition (autoignition) temperature
(g)Physical state (solid, liquid, gas)
(h)Specific gravity
(i)Toxic products of combustion
(j)Vapor density
(k)Vapor pressure
(l)Water solubility

OPS-4.1.2
NFPA 3-2.3.1.2
OSHA OPS-C

Identify the differences among the following terms:
(a)Exposure and hazard
(b)Exposure and contamination
(c)Contamination and secondary contamination

OPS-4.2
NFPA 3-2.3.2
OSHA OPS-A

Identify three types of stress that could cause a container system to release its contents.

OPS-4.3
NFPA 3-2.3.3
OSHA OPS-A

Identify five ways in which containers can breach.

OPS-4.4
NFPA 3-2.3.4
OSHA OPS-A

Identify four ways in which containers can release their contents.

OPS-4.5
Rad. 1st Resp.
(See Special Topics)

Identify the general testing requirements for “Type A,” ”Type B,” and “Special Form” packaging used for radioactive material transportation.

OPS-4.6
Rad. 1st Resp.
(See Special Topics)

Identify common “industrial radiography” sources and any specialized large-quantity radioactive materials packages commonly transported through the local jurisdiction by their shapes and characteristics.

OPS-4.7
NFPA 3-2.3.5
OSHA OPS-A

Identify at least four dispersion patterns that can be created upon release of a hazardous material.

OPS-4.8
NFPA 3-2.3.6
OSHA OPS-A

Identify the three general time frames for predicting the length of time that exposures can be in contact with hazardous materials in an endangered area.

OPS-4.9
NFPA 3-2.3.7
OSHA OPS-A

Identify the health and physical hazards that could cause harm.

OPS-4.10
NFPA 3-2.3.8
OSHA OPS-A,C

Identify the health hazards associated with the following terms:
(a)Asphyxiant
(b)Chronic health hazard
(c)Convulsant
(d)Irritant/corrosive
(e)Sensitizer/allergen

OPS-4.11
NFPA 3-2.3.9
(See Special Topics: Terrorism)

Given the following types of warfare agents, identify the corresponding DOT hazard class and division:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Blood agents
(d)Choking agents
(e)Irritants (riot control agents)
(f)Biological agents and toxins

See Special Topics: Terrorism for NFPA detailed examples.

Analyzing the Incident
Estimating the Potential Harm

OPS-5
NFPA 3-2.4
OSHA OPS-A

Given simulated incidents involving hazardous materials, estimate the potential harm within the endangered area.

OPS-5.1
NFPA 3-2.4.1
OSHA OPS-A

Identify a resource for determining the size of an endangered area of a hazardous materials incident.

OPS-5.2
NFPA 3-2.4.2
OSHA OPS-A

Given the dimensions of the endangered area and the surrounding conditions at a hazardous materials incident, estimate the number and type of exposures within that endangered area.

OPS-5.3
NFPA 3-2.4.3
OSHA OPS-A

Identify resources available for determining the concentrations of a released hazardous material within an endangered area.

OPS-5.4
NFPA 3-2.4.4
OSHA OPS-A

Given the concentrations of the released material, identify the factors for determining the extent of physical, health, and safety hazards within the endangered area of a hazardous materials incident.

Planning the Response
Describing Response Objectives for Hazardous Materials Incidents

OPS-6
NFPA 3-3.1
OSHA OPS-B,D

Given at least two scenarios involving hazardous materials incidents (one facility and one transportation), describe the first responder's response objectives for each problem.

OPS-6.1
NFPA 3-3.1.1
OSHA OPS-B,D

Identify the steps for determining the number of exposures that could be saved by the first responder with the resources provided by the authority having jurisdiction and operating in a defensive fashion, given an analysis of a hazardous materials problem and the exposures already lost.

OPS-6.2
NFPA 3-3.1.2
OSHA OPS-B,D

Describe the steps for determining defensive response objectives, given an analysis of a hazardous materials incident.

Planning the Response
Identifying Defensive Options

OPS-7
NFPA 3-3.2
OSHA OPS-D

Given simulated facility and transportation hazardous materials problems, identify the defensive options for each response objective.

OPS-7.1
NFPA 3-3.2.1
OSHA OPS-D,F

Identify the defensive options to accomplish a given response objective.

OPS-7.2
NFPA 3-3.2.2
OSHA OPS-F

Identify the purpose for, and the procedures, equipment, and safety precautions used with, each of the following control techniques:

(a)Absorption
(b)Dike, dam, diversion, retention
(c)Dilution
(d)Remote valve shutoff
(e)Vapor dispersion
(f)Vapor suppression

Planning the Response
Determining Appropriateness of Personal Protective Equipment

OPS-8
NFPA 3-3.3
OSHA OPS-B

Given the name of the hazardous material involved and the anticipated type of exposure, determine whether available personal protective equipment is appropriate for implementing a defensive option.

OPS-8.1
NFPA 3-3.3.1
OSHA I.C.-B.1,C.2

Identify the appropriate respiratory protection required for a given defensive option.

OPS-8.1.1
NFPA 3-3.3.1.1
OSHA I.C.-B.1,C.2

Identify the three types of respiratory protection and the advantages and limitations presented by the use of each at hazardous materials incidents.

OPS-8.1.2
NFPA 3-3.3.1.2
OSHA I.C.-B.1,C.2

Identify the required physical capabilities and limitations of personnel working in positive pressure self-contained breathing apparatus.

OPS-8.2
NFPA 3-3.3.2
OSHA I.C.-B.1,C.2

Identify the appropriate personal protective clothing required for a given defensive option.

OPS-8.2.1
NFPA 3-3.3.2.1
OSHA AWARE-A

Identify skin contact hazards encountered at hazardous materials incidents.

OPS-8.2.2
NFPA 3-3.3.2.2
OSHA OPS-B

Identify the purpose, advantages, and limitations of the following levels of protective clothing at hazardous materials incidents:

(a)Structural fire-fighting protective clothing
(b)High temperature-protective clothing
(c)Chemical-protective clothing
1.Liquid splash-protective clothing
2.Vapor-protective clothing

Planning the Response
Identifying Emergency Decontamination Procedures

OPS-9
NFPA 3-3.4
OSHA OPS-E,F

Given a plan of action for a hazardous materials incident, identify emergency decontamination procedures.

OPS-9.1
NFPA 3-3.4.1
OSHA OPS-A
OSHA AWARE-A,B

Identify ways that personnel, personal protective equipment, apparatus, and tools and equipment become contaminated.

OPS-9.2
NFPA 3-3.4.2
OSHA OPS-A
OSHA AWARE-A,B

Describe how the potential for secondary contamination determines the need for emergency decontamination procedures.

OPS-9.3
NFPA 3-3.4.3
OSHA OPS-E,F

Identify the purpose of emergency decontamination procedures at hazardous materials incidents.

OPS-9.4
NFPA 3-3.4.4
OSHA OPS-A,E,F

Identify the advantages and limitations of emergency decontamination procedures.

OPS-9.5
Rad. 1st Resp.
(See Special Topics)

Identify appropriate, simple procedures for dealing with accident victims with life-threatening injuries who are known or suspected to be contaminated with radioactive material.

OPS-9.6
NFPA 3-3.4.5
(See Special Topics: Terrorism)

Describe the procedure listed in the local Emergency Response Plan or the organization's Standard Operating Procedures for decontamination of a large number of people exposed to hazardous materials.

Implementing the Planned Response
Establishing and Enforcing Scene Control Procedures

OPS-10
NFPA 3-4.1
OSHA OPS-A
OSHA I.C.-B

Given scenarios for facility and/or transportation hazardous materials incidents, identify how to establish and enforce scene control including control zones, emergency decontamination, and communications.

OPS-10.1
NFPA 3-4.1.1
OSHA OPS-F
OSHA I.C.-B,D

Identify the procedures for establishing scene control through control zones.

OPS-10.2
NFPA 3-4.1.2
OSHA I.C.-B,D

Identify the criteria for determining the locations of the control zones at hazardous materials incidents.

OPS-10.3
NFPA 3-4.1.3
OSHA I.C.-B,D

Identify the basic techniques for the following protective actions at hazardous materials incidents:

(a)Evacuation
(b)Sheltering in-place protection

OPS-10.4
NFPA 3-4.1.4
OSHA OPS-E,F

Identify the considerations associated with locating emergency decontamination areas.

OPS-10.5
NFPA 3-4.1.5
OSHA OPS-E

Demonstrate the ability to perform emergency decontamination.

OPS-10.6
NFPA 3-4.1.6
OSHA OPS-F
OSHA I.C.-B.1
(See Special Topics: Terrorism)

Identify the items to be considered in a safety briefing prior to allowing personnel to work at the following:

(a)Hazardous materials incident
(b)Hazardous materials incident with criminal or terrorist activities

Implementing the Planned Response
Initiating the Incident Management System (IMS)

OPS-11
NFPA 3-4.2
OSHA I.C.-A,A.2

Given simulated facility and/or transportation hazardous materials incidents, initiate the incident management system (IMS) specified in the local emergency response plan and the organization's standard operating procedures.

OPS-11.1
NFPA 3-4.2.1
OSHA OPS-F
OSHA I.C.-D

Identify the role of the first responder at the operational level during hazardous materials incidents as specified in the local emergency response plan and the organization's standard operating procedures.

OPS-11.2
NFPA 3-4.2.2
OSHA I.C.-D

Identify the levels of hazardous materials incidents as defined in the local emergency response plan.

OPS-11.3	NFPA 3-4.2.3 *OSHA I.C.-A,A.1,A.2,B,D*	Identify the purpose, need, benefits, and elements of an incident management system (IMS) at hazardous materials incidents.
OPS-11.4	NFPA 3-4.2.4 *OSHA I.C.-A,B,D*	Identify the considerations for determining the location of the command post for a hazardous materials incident.
OPS-11.5	NFPA 3-4.2.5 *OSHA I.C.-A,B,D*	Identify the procedures for requesting additional resources at a hazardous materials incident.
OPS-11.6	NFPA 3-4.2.6 *OSHA I.C.-A.3,C.1*	Identify the authority and responsibilities of the safety officer.

Implementing the Planned Response
Using Personal Protective Equipment

OPS-12	NFPA 3-4.3 *OSHA OPS-B*	Demonstrate the ability to don, work in, and doff the personal protective equipment provided by the authority having jurisdiction.
OPS-12.1	NFPA 3-4.3.1 *OSHA I.C.-C.5*	Identify the importance of the buddy system in implementing the planned defensive options.
OPS-12.2	NFPA 3-4.3.2 *OSHA I.C.-C.2*	Identify the importance of the backup personnel in implementing the planned defensive options.
OPS-12.3	NFPA 3-4.3.3 *OSHA OPS-F*	Identify the safety precautions to be observed when approaching and working at hazardous materials incidents.
OPS-12.4	NFPA 3-4.3.4 *OSHA OPS-F*	Identify the symptoms of heat and cold stress.
OPS-12.5	NFPA 3-4.3.5 *OSHA I.C.-C*	Identify the physical capabilities required for, and the limitations of, personnel working in the personal protective equipment as provided by the authority having jurisdiction.
OPS-12.6	NFPA 3-4.3.6 *OSHA OPS-C*	Match the function of the operational components of the positive pressure self-contained breathing apparatus provided to the hazardous materials responder with the name of the component.
OPS-12.7	NFPA 3-4.3.7 *OSHA 29 CFR 1910.134*	Identify the procedures for cleaning, disinfecting, and inspecting respiratory protective equipment.

OPS-12.8
NFPA 3-4.3.8
OSHA 29 CFR 1910.134

Identify the procedures for donning, working in, and doffing positive pressure self-contained breathing apparatus.

OPS-12.9
NFPA 3-4.3.9
OSHA 29 CFR 1910.134

Demonstrate donning, working in, and doffing positive pressure self-contained breathing apparatus.

Implementing the Planned Response
Performing Defensive Control Actions

OPS-13
NFPA 3-4.4
OSHA OPS-D

Given a plan of action for a hazardous materials incident within their capabilities, demonstrate defensive control actions set out in the plan.

OPS-13.1
NFPA 3-4.4.1
OSHA OPS-D

Using the type of fire-fighting foam or vapor suppressing agent and foam equipment furnished by the authority having jurisdiction, demonstrate the proper application of the fire-fighting foam(s) or vapor suppressing agent(s) on a spill or fire involving hazardous materials.

OPS-13.2
NFPA 3-4.4.2
OSHA OPS-D

Identify the characteristics and applicability of the following foams:

(a)Protein
(b)Fluoroprotein
(c)Special purpose
    1.Polar solvent alcohol-resistant concentrates
    2.Hazardous materials concentrates
(d)Aqueous film-forming foam (AFFF)
(e)High expansion

OPS-13.3
NFPA 3-4.4.3
OSHA OPS-D,F

Given the appropriate tools and equipment, demonstrate how to perform the following defensive control activities:

(a)Absorption
(b)Damming
(c)Diking
(d)Dilution
(e)Diversion
(f)Retention
(g)Vapor dispersion
(h)Vapor suppression

OPS-13.4
NFPA 3-4.4.4
OSHA OPS-D,F

Identify the location and describe the use of the mechanical, hydraulic, and air emergency remote shutoff devices as found on cargo tanks.

OPS-13.5
NFPA 3-4.4.5
OSHA OPS-D,F

Describe the objectives and dangers of search and rescue missions at hazardous materials incidents.

OPS-13.6
NFPA 3-4.4.6
OSHA OPS-D,F
(See Special Topics: Terrorism)

Describe procedures, such as those listed in the local Emergency Response Plan or the organization's Standard Operating Procedures, to preserve evidence at hazardous materials incidents involving suspected criminal or terrorist acts.

Evaluating Progress

Evaluating the Status of Defensive Actions

OPS-14
NFPA 3-5.1
OSHA OPS-D

Given simulated facility and/or transportation hazardous materials incidents, evaluate the status of the defensive actions taken in accomplishing the response objectives.

OPS-14.1
NFPA 3-5.1.1
OSHA OPS-D
OSHA I.C.-A,D

Identify the considerations for evaluating whether defensive options are effective in accomplishing the objectives.

OPS-14.2
NFPA 3-5.1.2
OSHA OPS-D,F
OSHA I.C.-A,D
(See Special Topics: Terrorism)

Describe the circumstances under which it would be prudent to withdraw from a hazardous materials incident.

Evaluating Progress

Communicating the Status of the Planned Response

OPS-15
NFPA 3-5.2
OSHA OPS-D

Given simulated facility and/or transportation hazardous materials incidents, communicate the status of the planned response to the incident commander and other response personnel.

OPS-15.1
NFPA 3-5.2.1
OSHA OPS-D

Identify the methods for communicating the status of the planned response to the incident commander through the normal chain of command.

OPS-15.2
NFPA 3-5.2.2
OSHA OPS-A,D

Identify the methods for immediate notification of the incident commander and other response personnel about critical emergency conditions at the incident.

Hazardous Materials

Incident Response Training Guidelines

Hazardous Materials Technician

General Training Considerations

Introduction

Hazardous materials technicians shall be trained to meet all requirements of the first responder at the awareness and operations level and the technician level of emergency hazardous materials response. In addition, technicians shall meet the training requirements and be provided medical surveillance in accordance with requirements of OSHA, local occupational health and safety regulatory agencies, or EPA, as appropriate for their jurisdiction.

Definition

Technicians are those persons who respond to releases or potential releases of hazardous materials for the purpose of controlling the release. They are more aggressive than first responders at the operations level in that they will approach the point of release to plug, patch, or otherwise stop the release of a hazardous materials substance. They are expected to use specialized chemical protective clothing and specialized control equipment.

Audience

Technicians typically are members of hazardous materials response teams, which consist of specifically trained personnel who respond to hazardous materials incidents. The teams perform various response actions including assessment, firefighting, rescue, and containment; they are *not* responsible for cleanup operations following the incidents. Technicians are employed by various public and private organizations including fire or emergency medical services, law enforcement, public health, utilities, manufacturers, and contractors. By definition, technicians must be well versed in a wide variety of topics. They are expected to respond to most kinds of hazardous materials incidents that would occur in their jurisdictions. Therefore, training managers should be careful not to make this broad-based training too specialized. A community's analysis may suggest modifications. Emphasis should be placed on the most prevalent types of chemicals and incidents.

Equipment, Facilities, and Resources

Hazardous materials technician training requires both classroom and hands-on workspace as well as reference materials, equipment, and props. Consideration must be given to class size, weather conditions, number of instructors or evaluators, and available equipment and props. Because of the time involved in demonstration and performance activities, class size must be limited. A reasonable student-to-teacher ratio is 30:1 for lecture and 10:1 for hands-on activities, although some blocks of instruction (such as work with live chemicals) may require a 5:1 ratio. Extreme cold or heat will affect outdoor activities involving protective clothing, chemicals, and props. If outdoor exercises involving chemical protective clothing or actual chemicals are to be conducted, neighboring residences and facilities must be considered and notified. Arrangements for secured storage must be made to handle the expensive equipment that will have to be located near the classroom and work area.

Methodology Recommendation

Hazardous materials technician training is best conducted with a combination of classroom instruction using traditional lecture and small-group activities, field exercises involving group practice in simulated emergencies, and hands-on skill training in doing actual control, confinement, and containment exercises. Typically, training ranges from 40 to 240 hours, and longer courses often include awareness and operations training. There should be a strong emphasis on hands-on practice and incident decision-making. Content instruction should be synthesized in student activities requiring analysis of incident information to determine plans of action. Skill training should be performed on actual containers with simulated releases, using full protective equipment and proper response tools. Skill training should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential. Refresher training should include (1) competency retesting of all response skills, (2) technical information updates, and (3) critique of incident scene decision-making using simulated emergencies

Federal Requirements

For Hazardous Materials Technician Training

OSHA establishes the following training requirements for hazardous materials technicians. Methods of testing are not specified. Technicians shall have awareness training and operations training (for a minimum of 24 hours) and training at the technician level. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA CFR 1910.120 (q)(6)(iii)
HAZARDOUS MATERIALS TECHNICIAN

Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following area and the employer shall so certify:

- *(A) Know how to implement the employer's emergency response plan*
- *(B) Know the classification, identification and verification of known and unknown materials by using field survey instruments and equipment*
- *(C) Be able to function within an assigned role in the Incident Command System*
- *(D) Know how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician*
- *(E) Understand hazard and risk assessment techniques*
- *(F) Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit*
- *(G) Understand and implement decontamination procedures*
- *(H) Understand termination procedures*
- *(I) Understand basic chemical and toxicological terminology and behavior*

OSHA 29 CFR 1910.120(q)(10)

(10) Chemical protective clothing. Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists, shall meet the requirements of paragraphs (g)(3) through (5) of this section.

Required Training is specified in the OSHA regulations listed above. For the convenience of course assessment, the requirements are translated directly into the following nine sample principal objectives.

Identification	*Sample **Required** Training Objectives*
OSHA TECH-A	Given a simulated incident involving hazardous materials, demonstrate implementation of the employer's emergency response plan.
OSHA TECH-B	Using field survey instruments and equipment, classify, identify, and verify known and unknown hazardous materials.
OSHA TECH-C	Given a simulated incident involving hazardous materials, demonstrate functioning within an assigned role in the incident command system.

Required Training

OSHA TECH-D	Given a simulated incident involving hazardous materials, select and demonstrate use of proper specialized chemical personal protective equipment provided to the hazardous materials technician.
OSHA TECH-E	Identify hazard and risk assessment techniques.
OSHA TECH-F	Given simulated incidents involving different hazardous materials containers and releases, demonstrate advanced control, containment, and/or confinement operations.
OSHA TECH-G	Given a simulated incident involving hazardous materials, identify and demonstrate decontamination procedures.
OSHA TECH-H	List and describe hazardous materials incident termination procedures.
OSHA TECH-I	Define basic chemical and toxicological terms and describe basic chemical and toxicological behavior.

SUMMARY: Hazardous Materials Technician

OSHA minimum requirement=24 hours Operations training + Technician training

Audience	Prerequisites	Training	Refresher
Narrow. Prospective hazardous materials team members and others who are designated in response plans as a general resource to perform advanced defensive/ offensive operations at all anticipated hazardous materials emergencies.	1. First Responder Awareness training. 2. First Responder Operations training (min. 24 hours required).	- 40-240 hours. - Classroom and simulator/field instruction, with emphasis on hands-on training. - Competencies: - Knowledge of role of technician within incident command system and responsibilities within employer's emergency response plan. - Knowledge of hazardous materials terminology, behavior, and ability to perform advanced hazard and risk assessment using field survey instruments and equipment. - Ability to perform advanced control, containment and/or confinement techniques. - Ability to select and use specialized personal protective equipment. - Ability to implement decontamination procedures. - Knowledge of termination procedures.	1. Competency retesting of all response skills. 2. Technical information updates. 3. Incident scene decision-making using simulated emergencies.

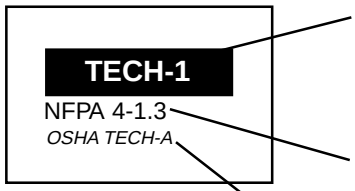
Recommended Training

For Hazardous Materials Technician Training

The following training objectives are recommended for hazardous materials technician training. The primary source for this material is NFPA 472, Chapter 4: Hazardous Materials Technician. Training objectives from other sources are noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

In general, these objectives compare in scope to those minimally required by OSHA. They do not constitute an increased level of training, but rather provide greater depth of definition of student objectives. To assist in assessing course compliance with OSHA 1910.120(q), the relationships between these objectives and the OSHA requirements are noted. References to OSHA 29 CFR 1910.120(q)(6)(iii)(A to I) are abbreviated as OSHA TECH-A to I.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as TECH-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective, Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 29 CFR 1910.120(q)(6)(iii)(A to I) = OSHA TECH-A to I

OSHA 29 CFR 1910.120(q)(6)(iv)(A to I) = OSHA HMSPEC-A to I

OSHA 29 CFR 1910.120(q)(6)(v)(A to F) = OSHA I.C.-A to F

OSHA 29 CFR 1910.120(q)(3)(i-ix) are subsumed under OSHA I.C.-A to F

Identification	***Recommended** Training Objectives*
TECH-1 NFPA 4-1.3 *OSHA TECH-A,B,E*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the hazardous materials technician.
TECH-1.1 NFPA 4-1.3(a) *OSHA TECH-B,E,I*	Describe the responsibility to analyze the hazardous materials incident and determine the magnitude of the problem in terms of outcomes.
TECH-1.1.1 NFPA 4-1.3(a)1 *OSHA TECH-B,E,I*	Identify the responsibility to survey the hazardous materials incident to identify special containers involved, to identify or classify unknown materials, and to verify the presence and concentrations of hazardous materials through the use of monitoring equipment.
TECH-1.1.2 NFPA 4-1.3(a)2 *OSHA TECH-B,E,I*	Identify the responsibility to collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment.

TECH-1.1.3 Identify the responsibility to determine the extent of damage to containers.
NFPA 4-1.3(a)3
OSHA TECH-B,E,I

TECH-1.1.4 Identify the responsibility to predict the likely behavior of released materials and their containers when multiple materials are involved.
NFPA 4-1.3(a)4
OSHA TECH-B,E,I

TECH-1.1.5 Identify the responsibility to estimate the size of an endangered area using computer modeling, monitoring equipment, or specialists in this field.
NFPA 4-1.3(a)5
OSHA TECH-B,E,I

TECH-1.2 Describe the responsibility to plan a response within the capabilities of available personnel, personal protective equipment, and control equipment.
NFPA 4-1.3(b)
OSHA TECH-A,B,C,D,E

TECH-1.2.1 Identify the response objectives for hazardous materials incidents.
NFPA 4-1.3(b)1
OSHA TECH-A,B,C,D,E

TECH-1.2.2 Identify the potential action options available by response objective.
NFPA 4-1.3(b)2
OSHA TECH-A,B,C,D,E

TECH-1.2.3 Identify the responsibility to select the personal protective equipment required for a given action option.
NFPA 4-1.3(b)3
OSHA TECH-A,B,C,D,E

TECH-1.2.4 Identify the responsibility to select the appropriate decontamination procedures.
NFPA 4-1.3(b)4
OSHA TECH-A,B,C,D,E

TECH-1.2.5 Identify the responsibility to develop a plan of action, including safety considerations, consistent with the local emergency response plan and the organization's standard operating procedures, and within the capability of the available personnel, personal protective equipment, and control equipment.
NFPA 4-1.3(b)5
OSHA TECH-A,B,C,D,E

TECH-1.3 Describe the responsibility to implement the planned response to favorably change the outcomes consistent with the organization's standard operating procedures and safety considerations.
NFPA 4-1.3(c)
OSHA TECH-D,F,G,H

TECH-1.3.1 Identify the responsibility to perform the duties of an assigned hazardous materials branch position within the local incident management system (IMS).
NFPA 4-1.3(c)1
OSHA TECH-D,F,G,H

TECH-1.3.2 Identify the responsibility to don, work in, and doff appropriate personal protective clothing, including, but not limited to, both liquid splash- and vapor-protective clothing with appropriate respiratory protection.
NFPA 4-1.3(c)2
OSHA TECH-D,F,G,H

TECH-1.3.3 Identify the responsibility to perform the control functions identified in the plan of action.
NFPA 4-1.3(c)3
OSHA TECH-D,F,G,H

TECH-1.4
NFPA 4-1.3(d)
OSHA TECH-C,F

Describe the responsibility to evaluate the progress of the planned response by evaluating the effectiveness of the control functions.

TECH-1.5
NFPA 4-1.3(e)
OSHA TECH-H

Describe the responsibility to terminate the incident.

TECH-1.5.1
NFPA 4-1.3(e)1
OSHA TECH-C,H

Identify the responsibility to assist in the incident debriefing.

TECH-1.5.2
NFPA 4-1.3(e)2
OSHA TECH-C,H

Identify the responsibility to assist in the incident critique.

TECH-1.5.3
NFPA 4-1.3(e)3
OSHA TECH-A,H

Identify the responsibility to provide reports and documentation of the incident.

Analyzing the Incident
Surveying the Hazardous Materials Incident

TECH-2
NFPA 4-2.1
OSHA TECH-B,E

Identify special containers involved and, given the appropriate equipment, identify or classify unknown materials, verify the identity of the hazardous materials, and determine the concentration of hazardous materials.

TECH-2.1
NFPA 4-2.1.1
OSHA TECH-E

Given examples of various specialized containers, identify each container by name and identify the material, and its hazard class, that is typically found in the container.

TECH-2.1.1
NFPA 4-2.1.1.1
OSHA TECH-E

Given examples of the following railroad cars, identify each car by type and identify at least one material, and its hazard class, that is typically found in each car:
(a)Cryogenic liquid tank cars
(b)High-pressure tube cars
(c)Nonpressure tank cars
(d)Pneumatically unloaded hopper cars
(e)Pressure tank cars

TECH-2.1.2
NFPA 4-2.1.1.2
OSHA TECH-E

Given examples of the following intermodal tanks, identify each intermodal tank by type and identify at least one material, and its hazard class, that is typically found in each tank:
(a)Nonpressure intermodal tanks:
1.IM-101 (IMO Type 1 internationally) portable tank
2.IM-102 (IMO Type 2 internationally) portable tank
(b)Pressure intermodal tanks (DOT 51) (IMO Type 5 internationally)
(c)Specialized intermodal tanks:
1.Cryogenic intermodal tanks (IMO Type 7 internationally)
2.Tube modules

TECH-2.1.3
NFPA 4-2.1.1.3
OSHA TECH-E

Given examples of the following cargo tanks, identify at least one material, and its hazard class, that is typically found in each tank:
(a)Dry bulk cargo tanks
(b)MC306/DOT-406 cargo tanks
(c)MC307/DOT-407 cargo tanks
(d)MC312/DOT-412 cargo tanks
(e)MC331 cargo tanks
(f)MC-338 cargo tanks

TECH-2.1.4
NFPA 4-2.1.1.4
OSHA TECH-E

Given examples of the following facility tanks, identify at least one material, and its hazard class, that is typically found in each tank:
(a)Nonpressure tank
(b)Pressure tank

TECH-2.1.5
NFPA 4-2.1.1.5
OSHA TECH-E

Given examples of the following nonbulk containers, identify at least one material, and its hazard class, that is typically found in each container:
(a)Bags
(b)Carboys
(c)Cylinders
(d)Drums

TECH-2.1.6
NFPA 4-2.1.1.6
(See Special Topics: Terrorism)

For each of the following, describe a method that can be used to detect them:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Biological agents and toxin
(d)Irritants (riot control agents)

TECH-2.1.7
NFPA 4-2.1.1.7
OSHA TECH-E

Given examples of the following radioactive materials packages, identify each package by type and identify at least one typical material found in each package:
(a)Type A
(b)Type B

TECH-2.2
NFPA 4-2.1.2
OSHA TECH-E

Given three examples of facility and transportation containers, identify the approximate capacity of each container.

TECH-2.2.1
NFPA 4-2.1.2.1
OSHA TECH-E

Using the markings on the container, identify the capacity (by weight and/or volume) of the following examples of transportation vehicles:
(a)Cargo tanks
(b)Tank cars
(c)Tank containers

TECH-2.2.2
NFPA 4-2.1.2.2
OSHA TECH-E

Using the markings on the container and other available resources, identify the capacity (by weight and/or volume) of each of the following facility containers:
(a)Nonpressure tank
(b)Pressure tank
(c)Cryogenic liquid tank

TECH-2.3
NFPA 4-2.1.3
OSHA TECH-B

Given at least three unknown materials, one of which is a solid, one a liquid, and one a gas, identify or classify by hazard each unknown material.

TECH-2.3.1
NFPA 4-2.1.3.1
OSHA TECH-B

Identify the steps in an analysis process for identifying unknown solid and liquid materials.

TECH-2.3.2
NFPA 4-2.1.3.2
OSHA TECH-B

Identify the steps in an analysis process for identifying an unknown atmosphere.

TECH-2.3.3
NFPA 4-2.1.3.3
OSHA TECH-B

Identify the type(s) of monitoring equipment, test strips, and reagents used to determine the following hazards:
(a)Corrosivity (pH)
(b)Flammability
(c)Oxidation potential
(d)Oxygen deficiency
(e)Radioactivity
(f)Toxic levels

TECH-2.3.4
NFPA 4-2.1.3.4
OSHA TECH-B

Identify the capabilities and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)Passive dosimeter
(f)Photoionization detectors
(g)pH indicators and/or pH meters
(h)Radiation detection instruments
(i)Reagents
(j)Test strips

TECH-2.3.5
Rad. 1st Resp.
(See Special Topics)
OSHA TECH-B

Demonstrate how radiation detection instruments may be used defensively.

TECH-2.3.6
NFPA 4-2.1.3.5
OSHA TECH-B

Given three hazardous materials, one of which is a solid, one a liquid, and one a gas, and the following monitoring equipment, test strips, and reagents, select the appropriate equipment and demonstrate the proper techniques to identify and quantify the materials:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)pH indicators and/or pH meters
(f)Radiation detection instruments
(g)Reagents
(h)Test strips

TECH-2.3.7
NFPA 4-2.1.3.6
OSHA TECH-B

Demonstrate the field maintenance and testing procedures for the monitoring equipment, test strips, and reagents provided by the authority having jurisdiction.

TECH-2.4
NFPA 4-2.1.4
OSHA TECH-B

Given a label for a radioactive material, identify vertical bars, contents, activity, and transport index, then describe the labeled item and its significance in surveying a radioactive materials incident.

Analyzing the Incident
Collecting and Interpreting Hazard and Response Information

TECH-3
NFPA 4-2.2
OSHA TECH-B,E

Given access to printed resources, technical resources, computer data bases, and monitoring equipment, collect and interpret hazard and response information not available from the current edition of the *North American Emergency Response Guidebook* or a material safety data sheet (MSDS).

TECH-3.1
NFPA 4-2.2.1
OSHA TECH-B,E

Identify and interpret the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

(a)Hazardous materials data bases
(b)Maps and diagrams
(c)Monitoring equipment
(d)Reference manuals
(e)Technical information centers (i.e., CHEMTREC/CANUTEC/SETIQ)
(f)Technical information specialists

TECH-3.2
NFPA 4-2.2.2
OSHA TECH-E
(See Special Topics: Terrorism)

Describe the following terms and explain their significance in the risk assessment process: (a)Acid, caustic; (b) Air reactivity; (c) Boiling point; (d) Catalyst; (e) Chemical interactions; (f) Chemical reactivity; (g) Compound, mixture; (h) Concentration; (i) Corrosivity (pH); (j) Critical temperatures and pressure; (k) Expansion ratio; (l) Flammable (explosive) range (LEL & UEL); (m) Fire point; (n) Flash point; (o) Halogenated hydrocarbon; (p) Ignition (autoignition) temperature; (q) Inhibitor; (r) Instability; (s) Ionic & covalent compounds; (t) Maximum safe storage temperature (MSST); (u) Melting point/freezing point; (v) Miscibility; (w) Organic and inorganic; (x) Oxidation potential; (y) pH; (z) Physical state (solid, liquid, gas); (aa) Polymerization; (bb) Radioactivity; (cc) Saturated, unsaturated, and aromatic hydrocarbons; (dd) Self-accelerating decomposition temperature (SADT); (ee) Solution, slurry; (ff) Specific gravity; (gg) Strength; (hh) Sublimation; (ii) Temperature of product; (jj) Toxic products of combustion; (kk) Vapor density; (ll) Vapor pressure; (mm) Viscosity; (nn) Volatility; (oo) Water reactivity; (pp) Water solubility; (qq) Nerve agents; (rr) Vesticants (blister agents); (ss) Biological agents and toxins; and (tt) Irritants (riot control agents).

TECH-3.3
NFPA 4-2.2.3
OSHA TECH-E

Describe the heat transfer processes that occur as a result of a cryogenic liquid spill.

TECH-3.4
NFPA 4-2.2.4
OSHA TECH-E

Given five hazardous material scenarios and the appropriate reference materials, identify the signs and symptoms of exposure to each material and the target organ effects of exposure to that material.

TECH-3.5
NFPA 4-2.2.5
OSHA TECH-B,E

Given the scenario of a domestic gas line break and the readings from a combustible gas indicator, determine the area of evacuation.

TECH-3.6
NFPA 4-2.2.6
OSHA TECH-B,E

Identify two methods for determining the pressure in bulk packaging or facility containers.

TECH-3.7
NFPA 4-2.2.7
OSHA TECH-B,E

Identify one method for determining the amount of lading remaining in damaged bulk packaging or facility containers.

Analyzing the Incident
Describing the Condition of the Container Involved in the Incident

TECH-4
NFPA 4-2.3
OSHA TECH-E

Given simulated facility and transportation container damage, describe the damage.

TECH-4.1
NFPA 4-2.3.1
OSHA TECH-E

Given three examples of containers, DOT specification markings for nonbulk and bulk packaging, and the appropriate reference guide, identify the basic design and construction features of each container.

TECH-4.1.1
NFPA 4-2.3.1.1
OSHA TECH-E

Identify the basic design and construction features, including closures, of the following bulk containers:

(a)Cargo tanks:
1.Dry bulk cargo tanks
2.MC-306/DOT-406 cargo tanks
3.MC-307/ DOT-407 cargo tanks
4.MC-312/DOT-412 cargo tanks
5.MC-331 cargo tanks
6.MC-338 cargo tanks

(b)Fixed facility tanks:
1.Nonpressure tank
2.Pressure tank

(c)Intermodal tanks:
1.Nonpressure intermodal tanks:
a.IM- 101 portable tank
b.IM-102 portable tank
2.Pressure intermodal tanks (specification 51)
3.Specialized intermodal tanks:
a.Cryogenic intermodal tanks
b.Tube modules

(d)One-ton containers
(e)Pipelines
(f)Railroad cars:
1.Cryogenic liquid tank cars
2.High-pressure tube cars
3.Nonpressure tank cars
4.Pneumatically unloaded hopper cars
5.Pressure tank cars

(g)Intermediate bulk containers (also known as tote tanks)

TECH-4.1.2
NFPA 4-2.3.1.2
OSHA TECH-E

Identify the basic design and construction features including closures of the following nonbulk containers:

(a)Carboys
(b)Drums
(c)Pressurized cylinders

TECH-4.1.3
NFPA 4-2.3.1.3
OSHA TECH-E

Identify the basic design and construction features of the following radioactive materials containers:

(a)Type A package
(b)Type B package

TECH-4.1.4
NFPA 4-2.3.1.6
(See Special Topics: Terrorism)

Demonstrate a method for collecting samples of the following:
(a)liquid
(b)solid
(c)gas

TECH-4.2
NFPA 4-2.3.2
OSHA TECH-E

Describe how a liquid pipeline can carry different products.

TECH-4.3
NFPA 4-2.3.3
OSHA TECH-E

Given an example of a pipeline, identify the following:
(a)Ownership of the line
(b)Procedures for checking for gas migration
(c)Procedure for shutting down the line or controlling the leak
(d)Type of product in the line

TECH-4.4
NFPA 4-2.3.4
OSHA TECH-E

Identify the types of damage that a pressure container could incur.

TECH-4.5
NFPA 4-2.3.5
OSHA TECH-E

Given examples of tank car damage, identify the type of damage in each example by name.

Analyzing the Incident
Predicting Likely Behavior of Materials and Their Containers When Multiple Materials are Involved

TECH-5
NFPA 4-2.4
OSHA TECH-E

Given examples of both facility and transportation incidents involving multiple hazardous materials, predict the likely behavior of the material in each case.

TECH-5.1
NFPA 4-2.4.1
OSHA TECH-E

Identify at least three resources available that indicate the effects of mixing various hazardous materials.

TECH-5.2
NFPA 4-2.4.2
OSHA TECH-E

Identify the impact of the following fire and safety features on the behavior of the products during an incident at a bulk storage facility and explain their significance in the risk assessment process:
(a)Fire protection systems
(b)Monitoring and detection systems
(c)Product spillage and control (impoundment and diking)
(d)Tank spacing
(e)Tank venting and flaring systems
(f)Transfer operations

Analyzing the Incident
Estimating the Likely Size of an Endangered Area

TECH-6
NFPA 4-2.5
OSHA TECH-E

Given various facility and transportation hazardous materials incidents, estimate the likely size, shape, and concentrations associated with the release of materials involved in the incident by using computer modeling, monitoring equipment, or specialists in this field.

TECH-6.1
NFPA 4-2.5.1
OSHA TECH-E

Identify local resources for dispersion pattern prediction and modeling including computers, monitoring equipment, or specialists in the field.

TECH-6.2
NFPA 4-2.5.2
OSHA TECH-E

Given the concentrations of the released material, identify the steps for determining the extent of the hazards (e.g., physical, safety, and health) within the endangered area of a hazardous materials incident.

TECH-6.2.1
NFPA 4-2.5.2.1
OSHA TECH-I

Describe the following toxicological terms and exposure values and explain their significance in the risk assessment process:
(a)Parts per million (ppm)
(b)Parts per billion (ppb)
(c)Lethal dose (LD_{50})
(d)Lethal concentrations (LC_{50})
(e)Permissible exposure limit (PEL)
(f)Threshold limit value time-weighted average (TLV-TWA)
(g)Threshold limit value short-term exposure limit (TLV-STEL)
(h)Threshold limit value ceiling (TLV-C)
(i)Immediately dangerous to life and health value (IDLH)

TECH-6.2.2
NFPA 4-2.5.2.2
OSHA TECH-E,I

Describe the following radiological terms and explain their significance in predicting the extent of health hazards and environmental impact in a hazardous materials incident:
(a)Types
(b)Measurement
(c)Protection

TECH-6.2.3
NFPA 4-2.5.2.3
OSHA TECH-E,I

Identify two methods for predicting the areas of potential harm within the endangered area of a hazardous materials incident.

TECH-6.3
NFPA 4-2.5.3
OSHA TECH-E,I

Identify a method for estimating the outcomes within an endangered area of a hazardous materials incident.

Planning the Response
Identifying Response Objectives

TECH-7
NFPA 4-3.1
OSHA TECH-F

Given simulated facility and transportation problems, describe the response objectives for each problem and describe the steps for determining response objectives (defensive, offensive, nonintervention) given an analysis of a hazardous materials incident.

Planning the Response
Identifying the Potential Action Options

TECH-8
NFPA 4-3.2
OSHA TECH-F

Given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and nonintervention) by response objective for each problem and identify the possible action options to accomplish a given response objective.

Planning the Response
Selecting Personal Protective Equipment

TECH-9
NFPA 4-3.3
OSHA TECH-D
OSHA I.C.-B.2

Given situations with known and unknown hazardous materials, determine the appropriate personal protective equipment for the action options specified in the plan of action in each situation.

TECH-9.1
NFPA 4-3.3.1
OSHA TECH-D

Identify the four levels of personal protective equipment (EPA/NIOSH or NFPA 471) and describe the equipment for each level and the condition under which each level is used.

TECH-9.2
NFPA 4-3.3.2
OSHA TECH-D
OSHA I.C.-C.1

Identify the factors to be considered in selecting the proper respiratory protection for a specified action option.

TECH-9.2.1
NFPA 4-3.3.2.1
OSHA TECH-D
OSHA I.C.-B.2,C.1

Describe the advantages, limitations, and proper use of the following types of respiratory protection at hazardous materials incidents:
(a)Positive pressure self-contained breathing apparatus
(b)Positive pressure air line respirators with required escape unit
(c)Air purifying respirators

TECH-9.2.2
NFPA 4-3.3.2.2
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the process for selecting the proper respiratory protection at hazardous materials incidents.

TECH-9.2.3
NFPA 4-3.3.2.3
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the operational components of air purifying respirators and air line respirators by name and describe their functions.

TECH-9.3
NFPA 4-3.3.3
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the factors to be considered in selecting the proper chemical-protective clothing for a specified action option.

TECH-9.3.1
NFPA 4-3.3.3.1
OSHA TECH-D,I

Describe the following terms and explain their impact and significance on the selection of chemical-protective clothing:
(a)Degradation
(b)Penetration
(c)Permeation

TECH-9.3.2
NFPA 4-3.3.3.2
OSHA TECH-D,I

Identify at least three indications of material degradation of chemical-protective clothing.

TECH-9.3.3
NFPA 4-3.3.3.3
OSHA TECH-D,I

Identify the three types of vapor-protective and splash-protective clothing and describe the advantages and disadvantages of each type.

TECH-9.3.4
NFPA 4-3.3.3.4
OSHA TECH-D

Identify the relative advantages and disadvantages of the following heat exchange units used for the cooling of personnel in chemical-protective clothing:
(a)Air cooled
(b)Ice cooled
(c)Water cooled

TECH-9.3.5
NFPA 4-3.3.3.5
OSHA TECH-D
OSHA I.C.-B.2,C.1

Identify the process for selecting the proper protective clothing at hazardous materials incidents.

TECH-9.3.6
NFPA 4-3.3.3.6
OSHA TECH-D
OSHA I.C.-B.2

Given three examples of various hazardous materials, determine the appropriate protective clothing construction materials for a given action option using chemical compatibility charts.

TECH-9.3.7
NFPA 4-3.3.3.7
OSHA TECH-D
OSHA I.C.-C

Identify the physical and psychological stresses that can affect users of specialized protective clothing.

Planning the Response
Developing Appropriate Decontamination Procedures

TECH-10
NFPA 4-3.4
OSHA TECH-A,G

Given a simulated hazardous materials incident, select an appropriate decontamination procedure and determine the equipment required to implement that procedure.

TECH-10.1
NFPA 4-3.4.1
OSHA TECH-A,G

Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used: (a) Absorption; (b) Adsorption; (c) Chemical degradation; (d) Dilution; (e) Disposal; (f) Evaporation; (g) Neutralization; (h) Solidification; (i) Vacuuming; and (j) Washing.

TECH-10.2
NFPA 4-3.4.2
OSHA TECH-A,G

Identify three sources of technical information for selecting appropriate decontamination procedures and identify how to contact those sources in an emergency.

Planning the Response
Developing a Plan of Action

TECH-11
NFPA 4-3.5
OSHA TECH-F
OSHA I.C.-A,B,C,D

Given simulated hazardous materials incidents in facility and transportation settings, develop a plan of action, including safety considerations, which are consistent with the local emergency response plan and the organization's standard operating procedures and are within the capability of available personnel, personal protective equipment, and control equipment for that incident.

TECH-11.1
NFPA 4-3.5.1
OSHA TECH-F

Describe the purpose of, procedures for, equipment required, and safety precautions used with the following techniques for hazardous materials control:
(a)Absorption
(b)Neutralization
(c)Overpacking
(d)Patching
(e)Plugging

TECH-11.2
NFPA 4-3.5.2
OSHA TECH-F

Given MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks, identify the common methods for product transfer from each type of cargo tank.

TECH-11.3
NFPA 4-3.5.3
OSHA TECH-F
OSHA HMSPEC-H

Given a simulated hazardous materials incident, develop the safety considerations that must be included in the plan of action.

TECH-11.3.1
NFPA 4-3.5.3.1
OSHA TECH-F
OSHA HMSPEC-H

List and describe the safety considerations to be included.

TECH-11.3.2
NFPA 4-3.5.3.2
OSHA TECH-F
OSHA HMSPEC-H

Identify the points that should be made in a safety briefing prior to working at the scene.

TECH-11.4
NFPA 4-3.5.4
OSHA TECH-F

Identify the atmospheric and physical safety hazards associated with hazardous materials incidents involving confined spaces.

TECH-11.5
NFPA 4-3.5.5
OSHA TECH-F

Identify the pre-entry activities to be performed.

TECH-11.6
NFPA 4-3.5.6
OSHA TECH-F
(See Special Topics: Terrorism)

Identify the procedures, equipment, and safety precautions for collecting legal evidence at hazardous materials incidents.

Implementing the Planned Response
Performing Incident Management Duties

TECH-12
NFPA 4-4.1
OSHA TECH-C,H

Given the local emergency response plan or organization's standard operating procedures and a simulated hazardous materials incident, demonstrate the duties of an assigned hazardous materials branch position within the local incident management system (IMS).

TECH-12.1
NFPA 4-4.1.1
OSHA TECH-C,H

Identify the role of the hazardous materials technician during an incident involving hazardous materials.

TECH-12.2
NFPA 4-4.1.2
OSHA I.C.-A,A.1,B,B.1,D

Identify the duties and responsibilities of the following hazardous materials branch functions within the incident management system:
(a)Backup
(b)Decontamination
(c)Entry
(d)Hazardous Materials Branch Management
(e)Hazardous Materials Branch Safety
(f)Information/research
(g)Reconnaissance
(h)Resources

TECH-12.3
NFPA 4-4.1.3
OSHA TECH-A,C,G
OSHA HMSPEC-G

Given a simulated hazardous materials incident, demonstrate setup of the decontamination corridor as specified in the planned response.

TECH-12.4
NFPA 4-4.1.4
OSHA TECH-A,G

Given a simulated hazardous materials incident, demonstrate the decontamination process specified in the planned response.

Implementing the Planned Response
Using Protective Clothing and Respiratory Protection

TECH-13
NFPA 4-4.2
OSHA TECH-D

Demonstrate the ability to don, work in, and doff both liquid splash- and vapor-protective chemical-protective clothing and any other specialized personal protective equipment provided by the authority having jurisdiction, including the appropriate respiratory protection.

TECH-13.1
NFPA 4-4.2.1
OSHA TECH-A,D

Describe three safety procedures for personnel wearing vapor-protective clothing.

TECH-13.2
NFPA 4-4.2.2
OSHA TECH-A,D

Describe three emergency procedures for personnel wearing vapor-protective clothing.

TECH-13.3
NFPA 4-4.2.3
OSHA TECH-D
OSHA 29 CFR 1910.134

Identify the procedures for donning, working in, and doffing the following types of respiratory protection:
(a)Air line respirator with required escape unit
(b)Air purifying respirator

TECH-13.4
NFPA 4-4.2.4
OSHA TECH-D

Demonstrate donning, working in, and doffing chemical-protective clothing in addition to any other specialized protective equipment provided by the authority having jurisdiction.

TECH-13.5
NFPA 4-4.2.5
OSHA TECH-D
OSHA (q)(10)

Demonstrate the ability to record the use, repair, and testing of chemical-protective clothing according to manufacturer's specifications and recommendations.

TECH-13.6
NFPA 4-4.2.6
OSHA TECH-A
OSHA (q)(10)

Describe the maintenance, testing, inspection, and storage procedures for personal protective equipment provided by the authority having jurisdiction according to the manufacturer's specifications and recommendations.

Implementing the Planned Response
Performing Control Functions Identified in Plan of Action

TECH-14
NFPA 4-4.3
OSHA TECH-F

Given various simulated hazardous materials incidents involving nonbulk and bulk packaging and facility containers, select the tools, equipment, and materials for the control of hazardous materials incidents and identify the precautions for controlling releases from those packaging/containers.

TECH-14.1
NFPA 4-4.3.1
OSHA TECH-F

Given a pressure vessel, select the appropriate material or equipment and demonstrate a method(s) to contain leaks from the following locations:
(a)Fusible metal of plug
(b)Fusible plug threads
(c)Side wall of cylinder
(d)Valve blowout
(e)Valve gland
(f)Valve inlet threads
(g)Valve seat
(h)Valve stem assembly blowout

TECH-14.2
NFPA 4-4.3.2
OSHA TECH-F

Given the fittings on a pressure container, demonstrate the ability to perform the following:
(a)Close valves that are open
(b)Replace missing plugs
(c)Tighten loose plugs

TECH-14.3
NFPA 4-4.3.3
OSHA TECH-F

Given a 55-gal (208-L) drum, demonstrate the ability to contain the following types of leaks using appropriate tools and materials:
(a)Bung leak
(b)Chime leak
(c)Forklift puncture
(d)Nail puncture

TECH-14.4
NFPA 4-4.3.4
OSHA TECH-F

Given a 55-gal (208-L) drum and an overpack drum, demonstrate the ability to place the 55-gal drum into the overpack drum using the following methods:
(a)Rolling slide-in
(b)Slide-in
(c)Slip-over

TECH-14.5
NFPA 4-4.3.5
OSHA TECH-A,F

Identify the maintenance and inspection procedures for the tools and equipment provided for the control of hazardous materials releases according to the manufacturer's specifications and recommendations.

TECH-14.6
NFPA 4-4.3.6
OSHA TECH-E

Identify three considerations for assessing a leak or spill inside a confined space without entering the area.

TECH-14.7
NFPA 4-1.3
OSHA TECH-A,E,F

Identify three safety considerations for product transfer operations.

TECH-14.8
NFPA 4-4.3.8
OSHA TECH-F

Given an MC-306/DOT-406 cargo tank and a dome cover clamp, demonstrate the ability to install the clamp on the dome properly.

TECH-14.9
NFPA 4-4.3.9
OSHA TECH-A,E,F

Identify the methods and precautions used when controlling a fire involving an MC-306/DOT-406 aluminum shell cargo tank.

TECH-14.10
NFPA 4-4.3.10
OSHA TECH-A,E,F

Describe at least one method for containing each of the following types of leaks in MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT- 412 cargo tanks:
(a)Dome cover leak
(b)Irregular-shaped hole
(c)Puncture
(d)Split or tear

TECH-14.11
NFPA 4-4.3.11
OSHA TECH-A,E,F

Describe three product removal and transfer considerations for overturned MC-306/DOT-406, MC-307/DOT-407, MC-312/DOT-412, MC-331, and MC-338 cargo tanks.

Evaluating Progress
Evaluating the Effectiveness of the Control Functions

TECH-15
NFPA 4-5.1
OSHA TECH-A,E,F

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging and the plan of action, evaluate the effectiveness of any control functions identified in the plan of action.

Terminating the Incident
Assisting in the Debriefing

TECH-16
NFPA 4-6.1
OSHA TECH-H

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, participate in the debriefing of the incident.

TECH-16.1
NFPA 4-6.1.1
OSHA TECH-H

Describe three components of an effective debriefing.

TECH-16.2
NFPA 4-6.1.2
OSHA TECH-H

Describe the key topics of an effective debriefing.

TECH-16.3
NFPA 4-6.1.3
OSHA TECH-H

Describe when a debriefing should take place.

TECH-16.4
NFPA 4-6.1.4
OSHA TECH-H

Describe who should be involved in a debriefing.

Terminating the Incident
Assisting in the Incident Critique

TECH-17
NFPA 4-6.2
OSHA TECH-H

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, provide operational observations of the activities that were performed in the hot and warm zones during the incident.

TECH-17.1
NFPA 4-6.2.1
OSHA TECH-H

Describe three components of an effective critique.

TECH-17.2
NFPA 4-6.2.2
OSHA TECH-H

Describe who should be involved in a critique.

TECH-17.3
NFPA 4-6.2.3
OSHA TECH-H

Describe why an effective critique is necessary after a hazardous materials incident.

TECH-17.4
NFPA 4-6.2.4
OSHA TECH-H

Describe which written documents should be prepared as a result of the critique.

Terminating the Incident
Providing Reports and Documentation

TECH-18
NFPA 4-6.3
OSHA TECH-A,H

Given a simulated hazardous materials incident, complete the reporting and documentation requirements consistent with the organization's emergency response plan and standard operating procedures.

TECH-18.1
NFPA 4-6.3.1
OSHA TECH-A,H

Identify the reports and supporting documentation required by the local emergency response plan and the organization's standard operating procedures.

TECH-18.2
NFPA 4-6.3.2
OSHA TECH-A,H

Demonstrate the proper completion of the reports required by the local emergency response plan and the organization's standard operating procedures.

TECH-18.3
NFPA 4-6.3.3
OSHA TECH-A,H

Describe the importance of personnel exposure records.

TECH-18.4
NFPA 4-6.3.4
OSHA TECH-A,H

Describe the importance of debriefing records.

TECH-18.5
NFPA 4-6.3.5
OSHA TECH-A,H

Describe the importance of critique records.

TECH-18.6 NFPA 4-6.3.6 *OSHA TECH-A,H*	Identify the steps in keeping an activity log and exposure records.
TECH-18.7 NFPA 4-6.3.7 *OSHA TECH-A,H*	Identify the steps to be taken in compiling incident reports that meet federal, state, local, and organizational requirements.
TECH-18.8 NFPA 4-6.3.8 *OSHA TECH-A,H*	Identify the requirements for compiling hot zone entry and exit logs.
TECH-18.9 NFPA 4-6.3.9 *OSHA TECH-A,H*	Identify the requirements for compiling personal protective equipment logs.
TECH-18.10 NFPA 4-6.3.10 *OSHA TECH-A,H*	Identify the requirements for filing documents and maintaining records.

Hazardous Materials

Incident Response Training Guidelines

On-Scene Incident Commander

General Training Considerations

Introduction

In title 29 of the Code of Federal Regulations, 1910. 120 (q)(6)(v), OSHA sets the minimum level of training and competencies required for incident commanders. Incident commanders who will assume control of the incident scene beyond the first responder at the awareness level shall receive at least 24 hours of training equal to the first responder at the operations level as well as training to the competencies defined in this section. The U.S. Environmental Protection Agency, individual States, and local agencies may require that incident commanders have additional training or competencies, such as those competencies defined in 29 CFR 1910.120(q)(3).

Definition

The incident commander is the person responsible for all decisions relating to the management of an incident and is in charge of the incident site. This is the equivalent to the on-scene incident commander as defined by OSHA 1910,120.

Audience

Incident commanders may be employed by public emergency response or private agencies that may respond to hazardous materials incidents. They are typically employees of law enforcement agencies, fire departments, emergency medical responders, emergency management agencies, public works departments, or any other agencies that may be expected to take the lead responsibility at a hazardous material incident.

Methodology Recommendations

Hazardous materials incident commander training should include a combination of traditional classroom lecture with small-group activities and large group field exercises. Training can range from 16 to 40 hours in length. Small-group classroom activities focusing on using the incident command system should be progressive in terms of incident complexity and resource management complexity. Table-top, field exercises, or large group incident scene simulations are optimal for overall command structure practice to develop effective incident management skills. For proper skill development during scenario practice, it is essential that there be proper critiques and corrective instructions of incident resource organization, style, and choice of delegation of command responsibilities, management of communication systems, and transfer of command. Testing and evaluation consist of a written examination and post-incident critique of simulations, including solutions to small-group activities and field exercises. Refresher training should include review of command structure SOP's, technical updates on State and federal response plans, and field exercise practice performing command roles in simulated emergencies.

SUMMARY: Incident Commander

OSHA requirement=24 hours Operations training + Incident Commander training

Audience	Prerequisites	Training	Refresher
Moderate in size. Responders whose level of command responsibility may include incident commander at all phases of a hazmat incident, from initial response through stabilization to incident termination.	1. First Responder Awareness training. 2. First Responder Operations training (min. 24 hours required).	- 16-40 hours. - Classroom and simulator/field instruction, with emphasis on incident management and resource coordination. - Competencies: - Knowledge of role of incident commander within incident command system and responsibilities within employer's emergency response plan. - Knowledge of State and federal emergency response plans. - Ability to manage and coordinate a hazmat incident response, including supervising hazard and risk assessment, coordinating control, containment and confinement operations, ensuring proper use of personal protective equipment, employing proper notification procedures, and ensuring correct decontamination procedures. - Ability to implement transfer of command and incident termination procedures.	1. Review of command structure SOP's. 2. Information updates on State and federal response plans. 3. Refresher practice incident scene management, coordination and decision-making using simulated emergencies.

Federal Requirements

For Incident Commander Training

OSHA establishes the following training requirements for incident commanders: a minimum of 24 hours of training at the first responder operations level plus training to the competencies described below or certification of sufficient experience as an alternative. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(v)
ON-SCENE INCIDENT COMMANDER

Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify.

- *(A) Know and be able to implement the employers incident command system*
- *(B) Know how to implement the employers emergency response plan*
- *(C) Know and understand the hazards and risks associated with employees working in chemical protective clothing*
- *(D) Know how to implement the local emergency response plan*
- *(E) Know of the state emergency response plan and of the Federal Regional Response Team*
- *(F) Know and understand the importance of decontamination procedures*

The following are additional OSHA requirements that must be reflected in the development of training objectives.

OSHA 29 CFR 1910.120(q)(3)(i-ix)

(i) The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS assisted by the senior official present for each employer.

Note to (q)(3)(i)- The "senior official" at an emergency response is the most senior official on the site who has the responsibility for controlling the operations at the site. Initially it is the senior officer on the first- due piece of responding emergency apparatus to arrive on the incident scene. As more senior officials arrive (i.e., battalion chief, fire chief, State law enforcement official, state coordinator, etc.) the position is passed up the line of authority which has been previously established.

(ii) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.

(iii) Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations., and assure that the personal protective equipment worn is appropriate for the hazards to be encountered. However, personal protective equipment shall meet, at a minimum, the criteria contained in 29 CFR 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage for any incident.

(iv) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in the emergency response, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees.

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(v) The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to the incident or site hazards, to those who are actively performing emergency operations. However, operations in hazardous areas shall be performed using the buddy system in groups of two or more.

(vi) Back-up personnel shall stand by with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, shall also be standing by with medical equipment and transportation capability.

(vii) The individual in charge of the ICS shall designate a safety officer, who is knowledgeable in the operations being implemented at the emergency response site, with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

(viii) When activities are judged by the safety officer to be an IDLH and/or involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any action needed to be taken to correct these hazards at the emergency scene.

(ix) After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.

See also OSHA 29 CFR 1910.120 Appendix C, Compliance Guidelines (6) in ICS and (7*)* Site Safety and Control Plans.

The safety and security of response personnel and others in the area of an emergency response incident site should be of primary concern of the incident commander. The use of a site safety and control plan could greatly assist those in charge of assuring the safety and health of employees on the site.

A comprehensive site safety and control plan should include the following: summary analysis of hazards on the site and risk analysis of those hazards; site map or sketch; site work zones (clean zone transition or decontamination zone, work or hot zone); use of the buddy system; site communications; command post or command center; standard operating procedures and safe work practices; medical assistance and triage area; hazard monitoring plan (air contamination monitoring, etc.); decontamination procedures and area; and other relevant areas. This plan should be part of the employer's emergency response plan or an extension of it to the specific site.

Required Training can be translated directly into the following six sample objectives:

Identification	*Sample **Required** Training Objectives*
OSHA I.C.-A	Given a simulated incident involving hazardous materials, demonstrate implementation of the employer's incident command system.
OSHA I.C.-A.1	Demonstrate establishing command, organizing resources and assigning subordinate units and personnel, and establishing lines of communication.- OSHA 29 CFR 1910.120(q)(3)(i)
OSHA I.C.-A.2	Demonstrate transfer of command.- Note to OSHA 29 CFR 1910.120(q)(3)(i)
OSHA I.C.-A.3	Define the roles and responsibilities of the safety officer.- OSHA 29 CFR 1910.120 (q)(3)(vii and viii)
OSHA I.C.-B	Given a simulated incident involving hazardous materials, demonstrate implementation of the employer's emergency response plan.
OSHA I.C.-B.1	Identify all hazardous substances or conditions present and describe as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies. OSHA 29 CFR 1910.120(q)(3)(ii)
OSHA I.C.-B.2	Determine and describe appropriate emergency operations, including correct use of personal protective equipment, based on the hazardous substance and/or conditions present. OSHA 29 CFR 1910.120(q)(3)(iii)
OSHA I.C.-C	Given a simulated incident involving hazardous materials, identify the hazards and risks associated with employees working in chemical protective clothing.
OSHA I.C.-C.1	Identify the process to determine, through the use of air monitoring, when it is safe for subordinate personnel to discontinue use of positive pressure self-contained breathing apparatus. OSHA 29 CFR 1910.120(q)(3)(iv)
OSHA I.C.-C.2	Identify strategies and tactics to minimize the number of emergency response personnel working in areas of potential or actual exposure to incident or site hazards, while using the buddy system in groups of two or more. OSHA 29 CFR 1910.120(q)(3)(v)
OSHA I.C.-C.3	Identify requirements for backup assistance and rescue personnel and qualified basic life support personnel, equipment, and transportation capability. OSHA 29 CFR 1910.120(q)(3)(vi)
OSHA I.C.-D	Given a simulated incident involving hazardous materials, demonstrate implementation of the local emergency response plan.
OSHA I.C.-E	Identify and describe the State emergency response plan and the federal regional response team.
OSHA I.C.-F	Given a simulated incident involving hazardous materials, identify and demonstrate management of decontamination procedures.

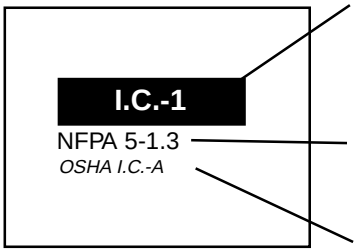
Recommended Training

Recommended Training
For Incident Commander

The following training objectives are recommended for on-scene incident commander training. The incident commander is responsible for directing and coordinating all aspects of a hazards materials incident. The primary source for the material is NFPA 472, Chapter 5: Competencies for the Incident Commander. Training objectives from other sources are so noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

In general, these objectives are comparable in scope to those minimally required by OSHA. They do not constitute an increased scope of training but rather provide greater depth of definition of trainee objectives and may suggest a greater length of training. To assist in assessing course compliance with OSHA 1910.120(q), the relationship between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.

The incident commander should be trained to meet all requirements indicated for the first responder at the awareness and operational levels as well as the requirements defined below. In addition, the incident commander should receive any additional training necessary to meet OSHA, local occupational health and safety regulations, or EPA requirements, whichever is appropriate for his or her jurisdiction.



Objective Identification Legend

This is the identification of the objective in this document. It matches the identification code used in course assignment references. Decimal numbers (such as I.C.-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of the objective. Usually it is directly from NFPA. In some cases, other source are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 1910.120(q)(6)(v)(A-F)= OSHA I.C.-A to F

OSHA 29 CFR 1910.120(q)(3)(i-ix) are subsumed under OSHA I.C.-A to F

Identification	***Recommended** Training Objectives*
I.C.-1 NFPA 5-1.3 *OSHA I.C.-A to F*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the incident commander.
I.C.-1.1 NFPA 5-1.3(a) *OSHA I.C.-A,B,D*	Describe the responsibility to analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes.
I.C.-1.1.1 NFPA 5-1.3(a)1 *OSHA I.C.-A,B,D*	Identify the responsibility to collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment.

I.C.-1.1.2 NFPA 5-1.3(a)2 *OSHA I.C.-A,B,D*	Identify the responsibility to estimate the potential outcomes within the endangered area at a hazardous materials incident.
I.C.-1.2 NFPA 5-1.3(b) *OSHA I.C.-A,B,D*	Describe the responsibility to plan response operations within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
I.C.-1.2.1 NFPA 5-1.3(b)1 *OSHA I.C.-A,B,D*	Identify the response objectives for hazardous materials incidents.
I.C.-1.2.2 NFPA 5-1.3(b)2 *OSHA I.C.-A,B,D*	Identify the potential action options (defensive, offensive, and nonintervention) available by response objective.
I.C.-1.2.3 NFPA 5-1.3(b)3 *OSHA I.C.-A,B,D*	Identify the responsibility to approve the level of personal protective equipment required for a given action option.
I.C.-1.2.4 NFPA 5-1.3(b)4 *OSHA I.C.-A,B,D*	Identify the responsibility to develop a plan of action, including safety considerations consistent with the local emergency response plan and the organization's standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment.
I.C.-1.3 NFPA 5-1.3(c) *OSHA I.C.-A,B,D*	Describe the responsibility to implement a response to favorably change the outcome consistent with the local emergency response plan and the organization's standard operating procedures.
I.C.-1.3.1 NFPA 5-1.3(c)1 *OSHA I.C.-A,B,D*	Identify the responsibility to implement an incident management system (IMS), including the specified procedures for notification and utilization of nonlocal resources, e.g., private, state, and federal government personnel.
I.C.-1.3.2 NFPA 5-1.3(c)2 *OSHA I.C.-A,B,D*	Identify the responsibility to direct resources (private, governmental, and others) with expected task assignments and on-scene activities and provide management overview, technical review, and logistical support to private and governmental sector personnel.
I.C.-1.3.3 NFPA 5-1.3(c)3 *OSHA I.C.-A,B,D*	Identify the responsibility to provide a focal point for information transfer to media and local elected officials through the IMS structure.
I.C.-1.4 NFPA 5-1.3(d) *OSHA I.C.-A,B,D*	Describe the responsibility to evaluate the progress of the planned response to ensure the response objectives are being met safely, effectively, and efficiently and adjust the plan of action accordingly by evaluating the effectiveness of the control functions.
I.C.-1.5 NFPA 5-1.3(e) *OSHA I.C.-A,B,D*	Describe the responsibility to terminate the incident.
I.C.-1.5.1 NFPA 5-1.3(e)1 *OSHA I.C.-A,B,D*	Identify the responsibility to transfer command (control) when appropriate.

I.C.-1.5.2
NFPA 5-1.3(e)2
OSHA I.C.-A,B,D

Identify the responsibility to conduct an incident debriefing.

I.C.-1.5.3
NFPA 5-1.3(e)3
OSHA I.C.-A,B,D

Identify the responsibility to conduct a multi-agency critique.

I.C.-1.5.4
NFPA 5-1.3(e)4
OSHA I.C.-A,B,D

Identify the responsibility to report and document the hazardous materials incident and submit the report to the proper entity.

Analyzing the Incident
Collecting and Interpreting Hazard and Response Information

I.C.-2
NFPA 5-2.1
OSHA I.C.-B.1

Given access to printed and technical resources, computer data bases, and monitoring equipment, collect and interpret hazard and response information not available from the current edition of the *North American Emergency Response Guidebook* or a material safety data sheet (MSDS) and identify and interpret the types of hazard and response information available from each of the following resources and explain the advantages and disadvantages of each resource:

(a)Reference manuals
(b)Hazardous materials data bases
(c)Technical information centers
(d)Technical information specialists
(e)Monitoring equipment

Analyzing the Incident
Estimating Potential Outcomes

I.C.-3
NFPA 5-2.2
OSHA I.C.-B.1

Given simulated facility or transportation incidents involving hazardous materials, the surrounding conditions, and the predicted behavior of the container and its contents, estimate the potential outcomes within the endangered area.

I.C.-3.1
NFPA 5-2.2.1
OSHA I.C.-B.1

Identify the steps for estimating the number of exposures within the endangered area.

I.C.-3.2
NFPA 5-2.2.2
OSHA I.C.-B.1

Describe the following toxicological terms and exposure values and explain their significance in the risk assessment process:

(a)Parts per million (ppm)
(b)Parts per billion (ppb)
(c)Lethal dose (LD_{50})
(d)Lethal concentrations (LC_{50})
(e)Permissible exposure limit (PEL)
(f)Threshold limit value time-weighted average (TLV-TWA)
(g)Threshold limit value short-term exposure limit (TLV-STEL)
(h)Threshold limit value ceiling (TLV-C)
(i)Immediately dangerous to life and health value (IDLH)

I.C.-3.3
NFPA 5-2.2.3
OSHA I.C.-B.1

Describe the following radiological materials terms and explain their significance in predicting the extent of health hazards and environmental impact in a hazardous materials incident:
(a)Types
(b)Measurement
(c)Protection

I.C.-3.4
NFPA 5-2.2.4
(See Special Topics: Terrorism)

Describe the health risks associated with the following:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Blood agents
(d)Choking agents
(e)Biological agents and toxins
(f)Irritants (riot control agents).

See Special Topics: Terrorism for NFPA detailed examples.

I.C.-3.5
NFPA 5-2.2.5
OSHA I.C.-B.1

Identify two methods for predicting the areas of potential harm within the endangered area of a hazardous materials incident.

I.C.-3.6
NFPA 5-2.2.6
OSHA I.C.-B.1

Identify the methods available to the organization for obtaining local weather conditions and predictions for short-term future weather changes.

I.C.-3.7
NFPA 5-2.2.7
OSHA I.C.-B.1,B.2

Explain the basic toxicological principles relative to assessment and treatment of personnel exposed to hazardous materials, including the following:
(a)Acute and delayed toxicity (chronic)
(b)Routes of exposure to toxic materials
(c)Local and systemic effects
(d)Dose response
(e)Synergistic effects

Planning the Response
Identifying Response Objectives

I.C.-4
NFPA 5-3.1
OSHA I.C.-B.2

Given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and nonintervention) by response objectives for each problem and describe the steps for determining response objectives (defensive, offensive, and nonintervention) given an analysis of a hazardous materials incident.

Planning the Response
Identifying the Potential Action Options

I.C.-5
NFPA 5-3.2
OSHA I.C.-B.2

Given simulated facility and transportation hazardous materials incidents, identify the possible action options (defensive, offensive, and non-intervention) by response objective for each problem.

I.C.-5.1
NFPA 5-3.2.1
OSHA I.C.-B.2

Identify the possible action options to accomplish a given response objective.

I.C.-5.2
NFPA 5-3.2.2
OSHA I.C.-B.2

Identify the purpose of each of the following techniques for hazardous materials control:
(a)Absorption
(b)Neutralization
(c)Overpacking
(d)Patching
(e)Plugging

Planning the Response
Approving the Level of Personal Protective Equipment

I.C.-6
NFPA 5-3.3
OSHA I.C.-C

Given situations with known and unknown hazardous materials, approve the appropriate personal protective equipment for the action options specified in the plan of action in each situation.

I.C.-6.1
NFPA 5-3.3.1
OSHA I.C.-B.2,C,C.1

Identify the four levels of chemical protection (EPA/NIOSH) and describe the equipment required for each level with the conditions under which each level is used.

I.C.-6.2
NFPA 5-3.3.2
OSHA I.C.-C

Describe the following terms and explain their impact and significance on the selection of chemical- protective clothing:
(a)Degradation
(b)Penetration
(c)Permeation

I.C.-6.3
NFPA 5-3.3.3
OSHA I.C.-C

Describe three safety considerations for personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.

I.C.-6.4
NFPA 5-3.3.4
OSHA I.C.-C

Identify the physical and psychological stresses that can affect users of personal protective equipment.

I.C.-6.5
NFPA 5-3.3.5
(See Special Topics: Terrorism)

Identify the limitations of military chemical/biological protective clothing.

Planning the Response
Developing a Plan of Action

I.C.-7
NFPA 5-3.4
OSHA I.C.-A,A.1,B.1

Given simulated facility and transportation hazardous materials incidents, develop a plan of action consistent with the local emergency response plan and the organization's standard operating procedures that is within the capability of the available personnel, personal protective equipment, and control equipment.

I.C.-7.1
NFPA 5-3.4.1
OSHA I.C.-B,D

Identify the steps for developing a plan of action.

I.C.-7.2
NFPA 5-3.4.2
OSHA I.C.-B,D

Identify the factors to be evaluated in selecting public protective actions including evacuation and sheltering in-place.

I.C.-7.3
NFPA 5-3.4.3
OSHA I.C.-A,B,D,E
(See Special Topics: Terrorism)

Given the local emergency response plan and/or the organization's standard operating procedures, identify which agency will perform the following:

(a)Receive the initial notification
(b)Provide secondary notification and activation of response agencies
(c)Make ongoing assessments of the situation
(d)Command on-scene personnel (incident management system)
(e)Coordinate support and mutual aid
(f)Provide law enforcement and on-scene security (crowd control)
(g)Provide traffic control and rerouting
(h)Provide resources for public safety protective action (evacuation or shelter in-place)
(i)Provide fire suppression services when appropriate
(j)Provide on-scene medical assistance (ambulance) and medical treatment (hospital)
(k)Provide public notification (warning)
(l)Provide public information (news media statements)
(m)Provide on-scene communications support
(n)Provide emergency on-scene decontamination when appropriate
(o)Provide operational-level hazard control services
(p)Provide technician-level hazard mitigation services
(q)Provide environmental remedial action ("cleanup") services
(r)Provide environmental monitoring
(s)Implement on-site accountability
(t)On-site responder identification
(u)Command post security
(v)Crime scene investigation
(w)Evidence collection and sampling

I.C.-7.4
NFPA 5-3.4.4
OSHA I.C.-A

Identify the process for determining the effectiveness of an action option on the potential outcomes.

I.C.-7.5
NFPA 5-3.4.5
OSHA I.C.-A.3,B,C

Identify the safe operating practices/procedures that are required to be followed at a hazardous materials incident.

I.C.-7.5.1
NFPA 5-3.4.5.1
OSHA I.C.-B,C

Identify the importance of pre-incident planning relating to safety during responses to specific sites.

I.C.-7.5.2
NFPA 5-3.4.5.2
OSHA I.C.-A.3,B,C

Identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials incident.

I.C.-7.5.3
NFPA 5-3.4.5.3
OSHA I.C.-A.3,B,C

Identify at least three safety precautions associated with search and rescue missions at hazardous materials incidents.

I.C.-7.5.4
NFPA 5-3.4.5.4
OSHA I.C.-B,C,F

Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used:
(a)Absorption
(b)Adsorption
(c)Chemical degradation
(d)Dilution
(e)Disposal
(f)Evaporation
(g)Neutralization
(h)Solidification
(i)Vacuuming
(j)Washing

I.C.-7.5.5
NFPA 5-3.4.5.5
OSHA I.C.-B,C

Identify the atmospheric and physical safety hazards associated with hazardous materials incidents involving confined spaces.

Implementing the Planned Response
Implementing the Incident Management System

I.C.-8
NFPA 5-4.1
OSHA I.C.-A,A.1,B,B.1,D
(See Special Topics: Recovery and Clean-up)

Given a copy of the local emergency response plan, identify the requirements of the plan, including the required procedures for notification and utilization of nonlocal resources (private, state, and federal government personnel).

I.C.-8.1
NFPA 5-4.1.1
OSHA I.C.-B,D
(See Special Topics: recovery and Clean-up)

Identify the role of the incident commander during an incident involving hazardous materials.

I.C.-8.2
NFPA 5-4.1.2
OSHA I.C.-B,D
(See Special Topics: Recovery and Clean-up)

Identify the duties and responsibilities of the following hazardous materials branch functions within the incident management system:
(a)Backup
(b)Decontamination
(c)Entry
(d)Hazardous Materials Branch Management
(e)Hazardous Materials Branch Safety
(f)Information/research
(g)Reconnaissance
(h)Resources

I.C.-8.3
NFPA 5-4.1.3
OSHA I.C.-B,D,E
(See Special Topics: Recovery and Clean-up)

Identify the steps for implementing the local and related emergency response plans as required under SARA Title III (EPCRA) Section 303 of the federal regulations or other state and local emergency response planning legislation.

I.C.-8.4
NFPA 5-4.1.4
OSHA I.C.-D
(See Special Topics: Recovery and Clean-up)

Given the local emergency response planning documents, identify the elements of each of the documents.

I.C.-8.5
NFPA 5-4.1.5
OSHA I.C.-A
(See Special Topics: Recovery and Clean-up)

Identify the elements of the incident management system necessary to coordinate response activities at hazardous materials incidents.

I.C.-8.6
NFPA 5-4.1.6
OSHA I.C.-D,E
(See Special Topics: Recovery and Clean-up)

Identify the primary local, state, regional, and federal government agencies and identify the scope of their regulatory authority (including the regulations) pertaining to the production, transportation, storage, and use of hazardous materials and the disposal of hazardous wastes.

I.C.-8.7
NFPA 5-4.1.7
OSHA I.C.-B,D,E
(See Special Topics: Recovery and Clean-up)

Identify the government agencies and private sector resources offering assistance during a hazardous materials incident and identify their role and the type of assistance or resources available.

Implementing the Planned Response
Directing Resources (Private and Governmental)

I.C.-9
NFPA 5-4.2
OSHA I.C.-A,A.1,B,B.1,D

Given a simulated hazardous materials incident and the necessary resources to implement the planned response, demonstrate the ability to direct the resources in a safe and efficient manner consistent with the capabilities of those resources.

Implementing the Planned Response
Providing a Focal Point for Information Transfer to Media and Elected Officials

I.C.-10
NFPA 5-4.3
OSHA I.C.-A

Given a simulated hazardous materials incident, identify appropriate information to provide to the media and local, state, and federal officials.

I.C.-10.1
NFPA 5-4.3.1
OSHA I.C.-A

Identify the local policy for providing information to the media.

I.C.-10.2
NFPA 5-4.3.2
OSHA I.C.-A

Identify the responsibilities of the public information officer at a hazardous materials incident.

Evaluating Progress
Evaluating Progress of the Plan of Action

I.C.-11
NFPA 5-5.1
OSHA I.C.-A,B,D

Given simulated facility and transportation hazardous materials incidents, evaluate the progress of the plan of action to determine whether the efforts are accomplishing the response objectives.

I.C.-11.1
NFPA 5-5.1.1
OSHA I.C.-A,B,D

Identify the procedures for evaluating whether the action options are effective in accomplishing the objectives.

I.C.-11.2
NFPA 5-5.1.2
OSHA I.C.-A,B,B.2,D,F

Identify the steps for comparing actual behavior of the material and the container to that predicted in the analysis process.

I.C.-11.3
NFPA 5-5.1.3
OSHA I.C.-A,B,B.2,D,F

Determine the effectiveness of the following:
(a)Personnel being used
(b)Personal protective equipment
(c)Established control zones
(d)Decontamination process

Terminating the Incident
Transferring Command/Control

I.C.-12
NFPA 5-6.1
OSHA I.C.-A.2
Given the details of a simulated incident, the local emergency response plan, and the organization's standard operating procedures, the incident commander shall demonstrate the ability to effectively transfer command.

I.C.-12.1
NFPA 5-6.1.1
OSHA I.C.-A.2
Identify the appropriate steps to be taken to transfer command/control of the incident.

I.C.-12.2
NFPA 5-6.1.2
OSHA I.C.-A.2
Demonstrate the transfer of command/control.

Terminating the Incident
Conducting a Debriefing

I.C.-13
NFPA 5-6.2
OSHA I.C.-A,B,D
Given the details of a simulated hazardous materials incident, the incident commander shall conduct a debriefing of the incident.

I.C.-13.1
NFPA 5-6.2.1
OSHA I.C.-A,B,D
Describe three components of an effective debriefing.

I.C.-13.2
NFPA 5-6.2.2
OSHA I.C.-A,B,D
Describe the key topics in an effective debriefing.

I.C.-13.3
NFPA 5-6.2.3
OSHA I.C.-A,B,D
Describe when a debriefing should take place.

I.C.-13.4
NFPA 5-6.2.4
OSHA I.C.-A,B,D
Describe who should be involved in a debriefing.

I.C.-13.5
NFPA 5-6.2.5
OSHA I.C.-A,B,D
Identify the procedures for conducting incident debriefings at a hazardous materials incident.

Terminating the Incident
Conducting a Multi-Agency Critique

I.C.-14
NFPA 5-6.3
OSHA I.C.-A,B,D
Given details of a simulated multi-agency hazardous materials incident, conduct a critique of the incident.

I.C.-14.1
NFPA 5-6.3.1
OSHA I.C.-A,B,D
Describe three components of an effective critique.

I.C.-14.2
NFPA 5-6.3.2
OSHA I.C.-A,B,D
Describe who should be involved in a critique.

I.C.-14.3 NFPA 5-6.3.3 *OSHA I.C.-A,B,D*	Describe why an effective critique is necessary after a hazardous materials incident.
I.C.-14.4 NFPA 5-6.3.4 *OSHA I.C.-A,B,D*	Describe what written documents should be prepared as a result of the critique.
I.C.-14.5 NFPA 5-6.3.5 *OSHA I.C.-A,B,D*	Implement the procedure for conducting a critique of the incident.

Terminating the Incident

Reporting and Documenting the Hazardous Materials Incident

I.C.-15 NFPA 5-6.4 *OSHA I.C.-A,B,D*	Given a simulated hazardous materials incident, demonstrate the ability to report and document the incident consistent with the local, state, and federal requirements.
I.C.-15.1 NFPA 5-6.4.1 *OSHA I.C.-A,B,D*	Identify the reporting requirements of the federal, state, and local agencies.
I.C.-15.2 NFPA 5-6.4.2 *OSHA I.C.-A,B,D*	Identify the importance of documentation for a hazardous materials incident, including training records, exposure records, incident reports, and critique reports.
I.C.-15.3 NFPA 5-6.4.3 *OSHA I.C.-A,B,D*	Identify the steps in keeping an activity log and exposure records for hazardous materials incidents.
I.C.-15.4 NFPA 5-6.4.4 *OSHA I.C.-A,B,D*	Identify the requirements for compiling hazardous materials incident reports found in the local emergency response plan as well as the organization's standard operating procedures.
I.C.-15.5 NFPA 5-6.4.5 *OSHA I.C.-A,B,D*	Identify the requirements for filing documents and maintaining records found in the local emergency response plan and the organization's standard operating procedures.
I.C.-15.6 NFPA 5-6.4.6 *(See Special Topics: Terrorism)*	Identify the procedures required for legal documentation and chain of custody/continuity described in the organization's standard operating procedure or the local emergency operating plan.

Hazardous Materials

Incident Response Training Guidelines

Hazardous Materials Branch Officer

General Training Considerations

Introduction

The hazardous materials branch officer shall be trained to meet all competencies for the first responder at the awareness, operational, and technician levels and the competencies in this section. They also shall receive any additional training to meet applicable U.S. D.O.T., U.S.E.P.A., O.S.H.A. and other appropriate state, local or provincial occupational health and safety regulatory requirements.

Definition

The hazardous materials branch officer is that person who is responsible for directing and coordinating all operations assigned to the hazardous material branch by the incident commander. This function is akin to that of hazardous materials team leader and encompasses both the general command functions at the branch chief level in an incident command system and in addition includes the responsibility for technical and tactical leadership of the team of hazardous materials technicians at the incident. While the function of hazardous materials branch officer is not directly specified in OSHA 1910.120 or EPA 311, the branch officer function is a natural derivative of the incident command system requirements and incident commander delegation options which are themselves specified as required under the OSHA and EPA regulations for hazardous materials incident response.

Audience

The training audience for hazardous materials branch officer is relatively small in number and is technically advanced. The training audience should include existing members of hazardous materials response teams who have experience and training at the technician level and who have also demonstrated sufficient command and leadership potential to warrant training and subsequent assignment at the hazardous materials branch officer level.

Methodology Recommendations

Hazardous materials branch officer training is best conducted with a combination of classroom instruction using traditional lecture and small-group activities, field exercises involving group practice in simulated emergencies, and hands-on skill training in doing and supervising actual control, confinement and containment exercises. There should be a strong emphasis on field training to include incident decision-making and real time practice coordinating and directing the incident scene operations of the hazardous materials team. Content instruction should be synthesized in student activities requiring analysis of incident information to determine plans of action and requiring supervisory assessment of the performance of hazardous materials team members during operations to determine needed interventions and directions from the branch chief. Skill training and practice supervising subordinate skill evolutions should be performed on actual containers with simulated releases, using full protective equipment and proper response tools. Skill training and branch chief field supervision instruction should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential.

Refresher training should include (1) competency retesting of all response skills, (2) technical information updates, and (3) critique of incident scene decision-making and hazardous materials team leadership behaviors using simulated emergencies.

SUMMARY: Hazardous Materials Branch Officer

Audience	Prerequisites	Training	Refresher
Small in number. Members of hazmat teams at the technician level who have branch command and leadership potential.	Prior training and demonstrated competency at the awareness, operational, and technician levels.	- No specific length of training is recommended or commonly in use. Length of training should be sufficient to achieve competency. - Classroom, lab, and field exercise formats recommended. - Competencies include: Analyzing the incident; Planning the response; Implementing the response; Reporting and documenting the haz mat incident.	1. Retesting of resp skills. 2. Technical info updates. 3. Refreshing of incident scene decision-making and branch team leadership .

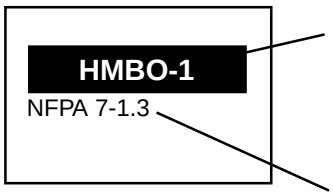
Recommended Training

For Hazardous Materials Branch Officer

The following training objectives are recommended for hazardous materials branch officer training. The primary source for this material is NFPA 472, Chapter 7: Competencies for the Hazardous Materials Branch Officer. Training objectives from other sources are noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

These objectives define competencies for a response function which is not directly specified by OSHA. However, the branch officer function is a natural derivative of the use of the incident command system and of the performance of the incident commander, including branch level delegation, both of which are required by OSHA. Because the function of hazardous materials branch officer is not directly specified in OSHA 29 CFR 1910.120, the following recommended training objectives are not individually cross-referenced to specific OSHA competency requirements. The general OSHA requirements which support this function are OSHA 29 CFR 1910.120 (q) (6) (v) for On Scene Incident Commander responsibilities including branch delegation and OSHA 29 CFR 1910.120 (q) (3) (i-ix) for the use of the Incident Command System during hazardous materials response.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as HMBO-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA 472, Chapter 7.

Identification	***Recommended** Training Objectives*
HMBO-1 NFPA 7-1.3	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the hazardous materials branch officer.
HMBO-1.1 NFPA 7-1.3(a)	Describe the responsibility to analyze a hazardous materials incident to determine the magnitude of the problem by estimating the potential outcomes within the endangered area.
HMBO-1.2 NFPA 7-1.3(b)	Describe the responsibility to plan a response within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
HMBO-1.2.1 NFPA 7-1.3(b)1	Identify the response objectives for hazardous materials incidents.
HMBO-1.2.2 NFPA 7-1.3(b)2	Identify the potential action options (defensive, offensive, and nonintervention) available by response objective.
HMBO-1.2.3 NFPA 7-1.3(b)3	Identify the responsibility to determine the level of personal protective equipment required for a given action option.

HMBO-1.2.4 NFPA 7-1.3(b)4	Identify the responsibility to provide recommendations to the incident commander for the development of a plan of action for the hazardous materials branch consistent with the local emergency response plan and the organization's standard operating procedures and within the capability of available personnel, personal protective equipment, and control equipment.
HMBO-1.3 NFPA 7-1.3(c)	Describe the responsibility to implement a response to favorably change the outcomes consistent with the local emergency response plan and the organization's standard operating procedures.
HMBO-1.3.1 NFPA 7-1.3(c)1	Identify the responsibility to implement the incident management system as it directly relates to the specified procedures for hazardous materials branch operations.
HMBO-1.3.2 NFPA 7-1.3(c)2	Identify the responsibility to direct hazardous materials branch resources (private, governmental, and others) with expected task assignments and on-scene activities and provide management overviews, technical review, and logistical support to hazardous materials branch resources.
HMBO-1.4 NFPA 7-1.3(d)	Describe the responsibility to evaluate the progress of the planned response to ensure that the response objectives are being met safely, effectively, and efficiently and adjust the plan of action accordingly by evaluating the progress of the plan of action.
HMBO-1.5 NFPA 7-1.3(e)	Describe the responsibility to terminate the incident.
HMBO-1.5.1 NFPA 7-1.3(e)1	Identify the responsibility to conduct a debriefing for hazardous materials branch personnel.
HMBO-1.5.2 NFPA 7-1.3(e)2	Identify the responsibility to conduct a critique for hazardous materials branch personnel.
HMBO-1.5.3 NFPA 7-1.3(e)3	Identify the responsibility to report and document the hazardous materials branch operations.

Analyzing the Incident
Estimating Potential Outcomes

HMBO-2 NFPA 7-2.1	Given simulated facility or transportation incidents involving hazardous materials, the surrounding conditions, and the predicted behavior of the container and its contents, estimate the potential outcomes within the endangered area.

Planning the Response
Selecting the Level of Personal Protective Equipment

HMBO-3 NFPA 7-3.1	Given situations with known and unknown hazardous materials, select the appropriate personal protective equipment for the action options specified in the plan of action in each situation.

Planning the Response
Developing a Plan of Action

HMBO-4
NFPA 7-3.2

Given simulated facility and transportation hazardous materials incidents, develop a plan of action consistent with the local emergency response plan and the organization's standard operating procedures that is within the capability of the available personnel, personal protective equipment, and control equipment.

HMBO-4.1
NFPA 7-3.2.1

Identify the order of the steps for developing a plan of action.

HMBO-4.2
NFPA 7-3.2.2

Identify the factors to be evaluated in selecting public protective actions, including evacuation and shelter in-place.

HMBO-4.3
NFPA 7-3.2.3

Given the local emergency response plan or the organization's standard operating procedure, identify procedures to accomplish the following tasks:

(a) Make ongoing assessments of the situation
(b) Command on-scene personnel (incident management system) assigned to the hazardous materials branch
(c) Coordinate hazardous materials support and mutual aid
(d) Provide resources for public protection action (evacuation or shelter in-place)
(e) Coordinate with fire suppression services as it relates to hazardous materials incidents
(f) Coordinate hazardous materials branch control, containment, or confinement operations
(g) Coordinate with the medical branch to ensure proper medical assistance (ambulance) and medical treatment (hospital)
(h) Coordinate on-scene decontamination when appropriate
(i) Coordinate activities with those of the environmental remedial action ("cleanup") services

HMBO-4.4
NFPA 7-3.2.4

Identify the process for determining the effectiveness of an action option on the potential outcomes.

HMBO-4.5
NFPA 7-3.2.5

Identify the procedures for presenting a safety briefing prior to allowing personnel to work on a hazardous materials incident.

Implementing the Planned Response
Implementing the Incident Management System

HMBO-5
NFPA 7-4.1

Given a copy of the local emergency response plan, identify the requirements of the plan, including the required procedures for notification and utilization of nonlocal resources (private, state, and federal government personnel).

HMBO-5.1
NFPA 7-4.1.1

Identify the process and procedures for obtaining cleanup and restoration services in the local emergency response plan or organization's standard operating procedures.

HMBO-5.2
NFPA 7-4.1.2

Identify the steps for implementing the local and related emergency response plans as required under SARA Title III Section 303 of the federal regulations or other local emergency response planning legislation.

HMBO-5.3 NFPA 7-4.1.3	Given the local emergency planning documents, identify the elements of each of the documents.
HMBO-5.4 NFPA 7-4.1.4	Identify the elements of the incident management system necessary to coordinate response activities at hazardous materials incidents.
HMBO-5.5 NFPA 7-4.1.5	Identify the primary local, state, regional, and federal government agencies and identify the scope of their regulatory authority (including the regulations) pertaining to the production, transportation, storage, and use of hazardous materials and the disposal of hazardous wastes.
HMBO-5.6 NFPA 7-4.1.6	Identify the governmental agencies and private sector resources offering assistance to the hazardous materials branch during a hazardous materials incident and identify their role and type of assistance or resources available.

Implementing the Planned Response
Directing Resources (Private and Governmental)

HMBO-6 NFPA 7-4.2	Given a simulated hazardous materials incident and the necessary resources to implement the planned response, demonstrate the ability to direct the hazardous materials branch resources in a safe and efficient manner consistent with the capabilities of those resources.

Implementing the Planned Response
Providing a Focal Point for Information Transfer to Media and Elected Officials

HMBO-7 NFPA 7-4.3	Given a simulated hazardous materials incident, demonstrate the ability to act as a resource to provide information to the incident commander or the public information officer for distribution to the media and local, state, and federal officials.
HMBO-7.1 NFPA 7-4.3.1	Identify the local policy for providing information to the media.
HMBO-7.2 NFPA 7-4.3.2	Identify the responsibilities of the public information officer at a hazardous materials incident.

Evaluating Progress
Evaluating Progress of the Plan of Action

HMBO-8 NFPA 7-5.1	Given simulated facility and transportation hazardous materials incidents, evaluate the progress of the plan of action to determine whether the efforts are accomplishing the response objectives.
HMBO-8.1 NFPA 7-5.1.1	Identify the procedures for evaluating whether the action options are effective in accomplishing the objectives.
HMBO-8.2 NFPA 7-5.1.2	Identify the steps for comparing actual behavior of the material and the container to that predicted in the analysis process.

HMBO-8.3 NFPA 7-5.1.3	Determine the effectiveness of the following: (a)Hazardous materials response personnel being used (b)Personal protective equipment (c)Established control zones (d)Control, containment, or confinement operations (e)Decontamination process

Terminating the Incident
Terminating the Emergency Phase of the Hazardous Materials Incident

HMBO-9 NFPA 7-6.1	Given a simulated hazardous materials incident, demonstrate the ability to terminate the emergency phase of the incident consistent with the local emergency response plan and the organization's standard operating procedures.
HMBO-9.1 NFPA 7-6.1.1	Identify the steps required in terminating the emergency phase of a hazardous materials incident.
HMBO-9.2 NFPA 7-6.1.2	Identify the procedures for conducting incident debriefings at a hazardous materials incident.
HMBO-9.3 NFPA 7-6.1.3	Identify the steps in transferring authority as prescribed in the local emergency response plan or the organization's standard operating procedures.

Terminating the Incident
Conducting a Debriefing

HMBO-10 NFPA 7-6.2	Given the details of a simulated hazardous materials incident, demonstrate the ability to conduct a debriefing of the incident for all units assigned to the hazardous materials branch.
HMBO-10.1 NFPA 7-6.2.1	Describe three components of an effective debriefing.
HMBO-10.2 NFPA 7-6.2.2	Describe the key topics in an effective debriefing.
HMBO-10.3 NFPA 7-6.2.3	Describe when a debriefing should take place.
HMBO-10.4 NFPA 7-6.2.4	Describe who should be involved in a debriefing.
HMBO-10.5 NFPA 7-6.2.5	Identify the procedures for conducting incident debriefings at a hazardous materials incident.

Terminating the Incident
Conducting a Critique

HMBO-11 NFPA 7-6.3	Given the details of a simulated hazardous materials incident, demonstrate the ability to conduct a critique of the incident for all units assigned to the hazardous materials branch.
HMBO-11.1 NFPA 7-6.3.1	Describe three components of an effective critique.
HMBO-11.2 NFPA 7-6.3.2	Describe who should be involved in a critique.
HMBO-11.3 NFPA 7-6.3.3	Describe why an effective critique is necessary after a hazardous materials incident.
HMBO-11.4 NFPA 7-6.3.4	Describe what written documents should be prepared as a result of the critique.
HMBO-11.5 NFPA 7-6.3.5	Identify the procedure for conducting a critique of the incident.
HMBO-11.6 NFPA 7-6.3.6	Identify the requirements for conducting a post-incident analysis as defined in the local emergency response plan, the organization's standard operating procedures, or federal, state, and local regulations.

Terminating the Incident
Reporting and Documenting the Hazardous Materials Incident

HMBO-12 NFPA 7-6.4	Given a simulated hazardous materials incident, demonstrate the ability to report and document the incident consistent with the local, state, and federal requirements.
HMBO-12.1 NFPA 7-6.4.1	Identify the reporting requirements of federal, state, and local agencies.
HMBO-12.2 NFPA 7-6.4.2	Identify the importance of documentation for a hazardous materials incident, including training records, exposure records, incident reports, and critique reports.
HMBO-12.3 NFPA 7-6.4.3	Identify the steps in keeping an activity log and exposure records for hazardous materials incidents.
HMBO-12.4 NFPA 7-6.4.4	Identify the requirements found in the local emergency response plan and the organization's standard operating procedures for compiling hazardous materials incident reports.
HMBO-12.5 NFPA 7-6.4.5	Identify the requirements for filing documents and maintaining records as defined in the local emergency response plan and the organization's standard operating procedures.

Hazardous Materials

Incident Response Training Guidelines

Safety Officer at Hazardous Materials Incidents

General Training Considerations

Introduction

There are two training categories combined in this section. The first is the safety officer at hazardous materials incidents, as defined by OSHA and the second is the hazardous materials branch safety officer, as defined by NFPA.

The safety officer at hazardous materials incidents, as defined by OSHA, shall be trained to meet appropriate OSHA regulatory requirements to identify and evaluate hazards and provide direction to the safety of operations for emergency response sites.

The hazardous materials branch safety officer, as defined by NFPA, shall be trained to meet all competencies for the first responder at the awareness, operational, and technician levels and the competencies in this section. They also shall receive any additional training to meet applicable U.S. D.O.T., U.S.E.P.A., O.S.H.A. and other appropriate state, local or provincial occupational health and safety regulatory requirements.

Definition

The safety officer at hazardous materials incidents (OSHA) and the hazardous materials branch safety officer (NFPA) are those persons who work within an incident command system (also called an incident management system) to ensure that recognized safe practices are followed within the hazardous materials branch.

The safety officer at hazardous materials incidents (OSHA) has the authority to alter, suspend or terminate activities that involve dangerous conditions. The safety officer at hazardous materials incidents advises the incident commander of actions that need to take place in order to correct the hazards.

The hazardous materials branch safety officer (NFPA) will be called upon to provide technical advice or assistance regarding safety issues to the hazardous materials branch officer and incident safety officer at a hazardous materials incident.

Audience

The training audience for both the safety officer at hazardous materials incidents (OSHA) and the hazardous materials branch safety officer (NFPA) is relatively small in number and is technically advanced. The safety officer at hazardous materials incidents (OSHA) are persons with the potential to be qualified at the incident commander level with sufficient hazardous materials knowledge to identify risks and needed interventions. The training audience should include existing members of hazardous materials response teams who have experience and training at the technician level and who have also demonstrated sufficient potential to warrant training and subsequent assignment at the hazardous materials branch safety officer level.

Methodology Recommendations

The safety officer at hazardous materials incidents (OSHA) and the hazardous materials branch safety officer (NFPA) training is best conducted with a combination of classroom instruction using traditional lecture and small-group activities and field exercises involving group practice in simulated emergencies. There should be a strong emphasis on field training to include incident operations, safety evaluation and problem solving, to include real time practice identifying and implementing safety interventions during the incident scene operations of the hazardous materials team. Content instruction should be synthesized in student activities requiring analysis of incident information to determine safe plans of action and requiring assessment of the performance of hazardous materials team members during operations to determine needed safety interventions. Training should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential.

Refresher training should include (1) technical information updates, (2) critique of the ability to analyze an incident and assist in planning a safe response, and (3) critique of incident scene safety evaluation and intervention skills using simulated emergencies.

Federal Requirements

For Safety Officer at Hazardous Materials Incidents

There are no federally specified training requirements for hazardous materials branch safety officers, but OSHA 29 CFR 1910.120 (q) (3)(vii-viii) specifies certain performance and competency requirements for safety officer at hazardous materials incidents, and employers are required to ensure that employees demonstrate competency in the skills defined. Although the safety officer was initially defined in OSHA as advising the incident commander only, subsequent OSHA interpretations acknowledge that there may be multiple safety officers at the incident scene, advising to several levels of command.

OSHA 29 CFR 1910.120 (q) (3)(vii-viii)

(vii) The individual in charge of the ICS shall designate a safety officer, who is knowledgeable in the operations being implemented at the emergency response site, with specific responsibilities to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

(viii) When activities are judged by the safety officer to be an IDLH and/or to involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.

Required training can be translated directly into the following three sample objectives.

OSHA SO-A	Given a simulated incident involving hazardous materials, demonstrate the ability to identify and evaluate hazards at the incident and provide direction to development of a safe response plan.
OSHA SO-B	Given a simulated response to an incident involving hazardous materials, demonstrate the ability to identify and evaluate unsafe operations, activities and/or conditions involving imminent danger.
OSHA SO-C	Given identified unsafe conditions in a simulated response to an incident involving hazardous materials, demonstrate the ability to determine appropriate interventions, including altering, suspending or terminating selected response activities, and coordinating those interventions with the individual in charge of the ICS at the incident.

SUMMARY: Safety Officer at Hazardous Materials Incidents (OSHA) and Hazardous Materials Branch Safety Officer (NFPA)

Audience	Prerequisites	Training	Refresher
Small in number.		-No specific length of training is recommended or commonly in use. Length of training should be sufficient to allow students to achieve competency. -Classroom, lab, and field exercise formats recommended, with an emphasis on real time field simulations requiring practice in developing safe response plans and identifying safety problems during the implementation of the response plan. -Competencies: - Analyzing the incident. - Assisting in developing a safe response plan. - Assisting in implementing the response plan safely. - Evaluating the response for safety problems	1.Technical information updates. 2.Using simulated emergencies, refreshing of ability to analyze incident and develop safe response plans. 3.Using simulated emergencies, refreshing of ability to evaluate the response and identify safety problems and needed interventions.
Safety Officer (OSHA) Responders at the inc. comm. level with potential for assignment as incident safety officer .	Prior training and demonstrated competency at the awareness, operational, and inc. comm. levels.		
Branch Safety Officer (NFPA) Responders at the technician level with potential for assignment at the haz mat branch safety officer level.	Prior training and demonstrated competency at the awareness, operational, and technician levels.		

Recommended Training

For Hazardous Materials Branch Safety Officer

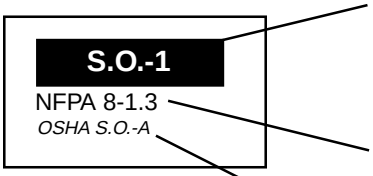
The following training objectives are recommended for hazardous materials branch safety officer training. The primary source for this material is NFPA 472, Chapter 8: Competencies for the Hazardous Materials Branch Safety Officer. Training objectives from other sources are noted, with discussion of the rationale for their inclusion to be found in the Special Topics section at the end of the Response Guidelines.

These objectives define competencies for a hazardous materials branch safety officer response function which is not directly specified by OSHA. However, OSHA 29 CFR 1910.120 (q) (3)(vii-viii) specifies certain performance and competency requirements for the safety officer at hazardous materials incidents, and employers are required to ensure that employees demonstrate competency in the skills defined. To assist in assessing course compliance with OSHA 1910.120 (q), the relationships between these hazardous materials branch safety officer objectives and OSHA requirements for the safety officer at the incident are noted. References to OSHA are abbreviated as noted.

Note that there is also a significant relationship between NFPA 472, Chapter 8: Competencies for the Hazardous Materials Branch Safety Officer and NFPA 1521, Competencies for Safety Officers. Most of the competencies listed below which are annotated to NFPA 472 may also be found in the special operations section of NFPA 1521.

The hazardous materials branch safety officer shall be trained to meet all competencies for the first responder at the awareness, operational, and technician levels and the competencies in this section. They also shall receive any additional training to meet applicable U.S. D.O.T., U.S.E.P.A., O.S.H.A. and other appropriate state, local or provincial occupational health and safety regulatory requirements.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as S.O. - 1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA are abbreviated as follows:

OSHA 29 CFR 1910.120 (q) (3) (vii-viii) = OSHA S.O. - A to C

Identification	***Recommended** Training Objectives*
S.O.-1 NFPA 8-1.3 *OSHA S.O.-A,B,C*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the hazardous materials branch safety officer.
S.O.-1.1 NFPA 8-1.3(a) *OSHA S.O.-B*	Describe the responsibility to analyze a hazardous materials incident to determine the magnitude of the problem in terms of safety by observing a scene and reviewing and evaluating hazard and response information as it pertains to the safety of all persons within the hazardous materials branch.
S.O.-1.2 NFPA 8-1.3(b) *OSHA S.O.-A*	Describe the responsibility to assist in planning a safe response within the capabilities of available response personnel, personal protective equipment, and control equipment.

S.O.-1.2.1 NFPA 8-1.3(b)1 *OSHA S.O.-A*	Identify the safety precautions for potential action options.
S.O.-1.2.2 NFPA 8-1.3(b)2 *OSHA S.O.-A*	Identify the responsibility to provide recommendations regarding safety considerations.
S.O.-1.2.3 NFPA 8-1.3(b)3 *OSHA S.O.-A*	Identify the responsibility to assist in the development of a plan of action.
S.O.-1.2.4 NFPA 8-1.3(b)4 *OSHA S.O.-A*	Identify the responsibility to review the plan of action and provide recommendations regarding safety.
S.O.-1.2.5 NFPA 8-1.3(b)5 *OSHA S.O.-A*	Identify the responsibility to review the selection of personal protective equipment required for a given action option.
S.O.-1.2.6 NFPA 8-1.3(b)6 *OSHA S.O.-A*	Identify the responsibility to review the decontamination operations.
S.O.-1.2.7 NFPA 8-1.3(b)7 *OSHA S.O.-A*	Identify the responsibility to ensure that the proper emergency medical services are provided.
S.O.-1.3 NFPA 8-1.3(c) *OSHA S.O.-A,B*	Describe the responsibility to ensure the implementation of a safe planned response consistent with the local emergency response plan, the organization's standard operating procedures, and safety considerations.
S.O.-1.3.1 NFPA 8-1.3(c)1 *OSHA S.O.-A,B,C*	Identify the responsibility to perform the duties of the hazardous materials branch safety officer within the local incident management system (IMS).
S.O.-1.3.2 NFPA 8-1.3(c)2 *OSHA S.O.-A*	Identify safety considerations for personnel performing the control functions identified in the plan of action.
S.O.-1.3.3 NFPA 8-1.3(c)3 *OSHA S.O.-A,B,C*	Identify the responsibility to conduct safety briefings for personnel performing the control functions identified in the plan of action.
S.O.-1.3.4 NFPA 8-1.3(c)4 *OSHA S.O.-A,B*	Identify the responsibility to assist in the implementation and enforcement of safety considerations.
S.O.-1.3.5 NFPA 8-1.3(c)5 *OSHA S.O.-A,C*	Identify the responsibility to maintain communications within the incident command structure during the incident.
S.O.-1.3.6 NFPA 8-1.3(c)6 *OSHA S.O.-A,B*	Identify the responsibility to monitor status reports of activities in the hot and warm zones.

S.O.-1.3.7
NFPA 8-1.3(c)7
OSHA S.O.-A,B

Identify the responsibility to ensure the implementation of exposure monitoring (personnel and environment).

S.O.-1.4
NFPA 8-1.3(d)
OSHA S.O.-A,B

Describe the responsibility to evaluate the progress of the planned response to ensure that the response objectives are being met safely.

S.O.-1.4.1
NFPA 8-1.3(d)1
OSHA S.O.-B

Identify deviations from safety considerations and any dangerous situations.

S.O.-1.4.2
NFPA 8-1.3(d)2
OSHA S.O.-B,C

Identify the responsibility to alter, suspend, or terminate any activity that can be judged to be unsafe.

S.O.-1.5
NFPA 8-1.3(e)
OSHA S.O.-A

Describe the responsibility to assist in terminating the incident.

S.O.-1.5.1
NFPA 8-1.3(e)1
OSHA S.O.-A,C

Identify the responsibility to perform the reporting, documentation and follow-up required of the hazardous materials branch safety officer.

S.O.-1.5.2
NFPA 8-1.3(e)2
OSHA S.O.-A,B

Identify the responsibility to assist in the debriefing of hazardous materials branch personnel.

S.O.-1.5.3
NFPA 8-1.3(e)3
OSHA S.O.-A,B

Identify the responsibility to assist in the incident critique.

Analyzing the Incident
Determining the Magnitude of the Problem in Terms of Safety

S.O.-2
NFPA 8-2.1
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, observe a scene and review and evaluate hazard and response information as it pertains to the safety of all persons within the hazardous materials branch.

S.O.-2.1
NFPA 8-2.1.1
OSHA S.O.-A

Describe the following radioactive materials terms and explain their significance in predicting the extent of health hazards and environmental impact in a hazardous materials incident:

(a)Types
(b)Measurement
(c)Protection

S.O.-2.2
NFPA 8-2.1.2
OSHA S.O.-A

Describe the following toxicological terms and exposure values and explain their significance in the risk assessment process:
(a)Parts per million (ppm)
(b)Parts per billion (ppb)
(c)Lethal dose (LD_{50})
(d)Lethal concentrations (LC_{50})
(e)Permissible exposure limit (PEL)
(f)Threshold limit value time-weighted average (TLV-TWA)
(g)Threshold limit value short-term exposure limit (TLV-STEL)
(h)Threshold limit value ceiling (TLV-C)
(i)Immediately dangerous to life and health value (IDLH)

S.O.-2.3
NFPA 8-2.1.3
OSHA S.O.-A

Explain the basic toxicological principles relative to assessment and treatment of personnel exposed to hazardous materials, including the following:
(a)Acute and delayed toxicity
(b)Dose-response
(c)Local and systemic effects
(d)Routes of exposure to toxic materials
(e)Synergistic effects

S.O.-2.4
NFPA 8-2.1.4
OSHA S.O.-A

Identify five conditions where the hazards from flammability would require chemical-protective clothing with thermal protection.

S.O.-2.5
NFPA 8-2.1.5
OSHA S.O.-A

Identify five conditions where personnel would not be allowed to enter the hot zone.

S.O.-2.6
NFPA 8-2.1.6
OSHA S.O.-A

Given the names of five hazardous materials and at least three reference sources, identify the physical and chemical properties and their potential impact on the safety of personnel at an incident involving each of the materials.

S.O.-2.7
NFPA 8-2.1.7
OSHA S.O.-A

Given the names of five hazardous materials and at least three reference sources, identify the health concerns and their potential impact on the safety and health of personnel at an incident involving each of the materials.

S.O.-2.8
NFPA 8-2.1.8
OSHA S.O.-A

Given the names of five hazardous materials and a description of their containers, identify five hazards or physical conditions that would impact the safety of personnel at an incident involving each of the materials.

S.O.-2.9
NFPA 8-2.1.9
OSHA S.O.-A

Given at least three unknown materials, one of which is a solid, one a liquid, and one a gas, identify or classify by hazard each unknown material.

S.O.-2.9.1
NFPA 8-2.1.9.1
OSHA S.O.-A

Identify steps in an analysis process for identifying unknown solid and liquid materials.

S.O.-2.9.2
NFPA 8-2.1.9.2
OSHA S.O.-A

Identify steps in an analysis process for identifying an unknown atmosphere.

S.O.-2.9.3
NFPA 8-2.1.9.3
OSHA S.O.-A

Identify the type(s) of monitoring equipment, test strips, and reagents used to determine the following hazards:
(a)Corrosivity (pH)
(b)Flammability
(c)Oxidation potential
(d)Oxygen deficiency
(e)Radioactivity
(f)Toxic levels

S.O.-2.9.4
NFPA 8-2.1.9.4
OSHA S.O.-A

Identify the capabilities and limiting factors associated with the selection and use of the following monitoring equipment, test strips, and reagents:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)Passive dosimeter
(f)Photoionization detectors
(g)pH indicators and/or pH meters
(h)Radiation detection instruments
(i)Reagents
(j)Test strips

S.O.-2.9.5
NFPA 8-2.1.9.5
OSHA S.O.-A

Given three hazardous materials, one of which is a solid, one a liquid, and one a gas, and the following monitoring equipment, select and demonstrate the appropriate equipment to identify and quantify the materials:
(a)Carbon monoxide meter
(b)Colorimetric tubes
(c)Combustible gas indicator
(d)Oxygen meter
(e)pH papers and/or pH meters
(f)Radiation detection instruments
(g)Reagents
(h)Test strips

S.O.-2.9.6
NFPA 8-2.1.9.6
OSHA S.O.-A

Demonstrate the field maintenance and testing procedures for the monitoring equipment, test strips and reagents provided by the authority having jurisdiction.

Planning the Response
Identifying the Safety Precautions for Potential Action Options

S.O.-3
NFPA 8-3.1
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, assist in planning a safe response within the capabilities of available response personnel, personal protective equipment, and control equipment.

S.O.-3.1
NFPA 8-3.1.1
OSHA S.O.-A

Identify five specific safety precautions to observe while mitigating each of the hazards or conditions identified in 8-2.1.8.

S.O.-3.2
NFPA 8-3.1.2
OSHA S.O.-A

Identify five safety precautions associated with search and rescue missions at hazardous materials incidents.

Planning the Response
Providing Recommendations Regarding Safety Considerations

S.O.-4
NFPA 8-3.2
OSHA S.O.-A,C

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, provide the incident safety officer, hazardous materials branch officer, and incident commander with observation-based recommendations regarding considerations for the safety of on-site personnel and be able to identify five recommendations to the incident commander regarding safety considerations on the hazards or conditions for each of the hazardous materials and containers identified in S.O.-2.8(NFPA 8-2.1.8).

Planning the Response
Assisting in the Development of a Plan of Action

S.O.-5
NFPA 8-3.3
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, assist the incident safety officer and hazardous materials branch officer in the development of a safe plan of action.

S.O.-5.1
NFPA 8-3.3.1
OSHA S.O.-A

Identify the importance and list five benefits of pre-emergency planning relating to specific sites.

S.O.-5.2
NFPA 8-3.3.2
OSHA S.O.-A

Identify and name five hazards and precautions to be observed when approaching a hazardous materials incident.

S.O.-5.3
NFPA 8-3.3.3
OSHA S.O.-A

List the elements of safety considerations.

S.O.-5.4
NFPA 8-3.3.4
OSHA S.O.-A

Given an organizations pre-incident plan and a simulated hazardous materials incident involving one of the hazardous materials and containers described in 8-2.1.8, develop safety considerations for the incident.

Planning the Response
Providing Recommendations Regarding Safety and Reviewing the Plan of Action

S.O.-6
NFPA 8-3.4
OSHA S.O.-A

Given a proposed plan of action for an incident involving one of the hazardous materials and containers described in 8-2.1.8, identify to the incident safety officer, hazardous materials branch officer, and incident commander the safety precautions for the plan of action.

S.O.-6.1
NFPA 8-3.4.1
OSHA S.O.-A

Ensure that the safety considerations in the proposed plan of action are consistent with the local emergency response plan and the organization's standard operating procedures.

S.O.-6.2
NFPA 8-3.4.2
OSHA S.O.-A

Make recommendations to the incident commander on the safety considerations in the proposed plan of action.

Planning the Response
Reviewing Selection of Personal Protective Equipment

S.O.-7
NFPA 8-3.5
OSHA S.O.-A

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, demonstrate the ability to review the selection of personal protective equipment required for a given action option.

S.O.-7.1
NFPA 8-3.5.1
OSHA S.O.-A

Identify the four levels of chemical protection (EPA/NIOSH) and describe the equipment required for each level and the conditions under which each level is used.

S.O.-7.2
NFPA 8-3.5.2
OSHA S.O.-A

Identify five safety considerations for personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.

S.O.-7.3
NFPA 8-3.5.3
OSHA S.O.-A

Given the names of five different hazardous materials and a chemical compatibility chart for chemical-protective clothing, identify the chemical-protective clothing that would provide the appropriate protection to the wearer for each of the five substances.

S.O.-7.4
NFPA 8-3.5.4
OSHA S.O.-A

Given the names of five different hazardous materials, identify appropriate chemical-protective clothing levels for typical action options.

S.O.-7.5
NFPA 8-3.5.5
OSHA S.O.-A

Demonstrate proper methods for donning, doffing, and using all personal protective equipment provided by the authority having jurisdiction for use in hazardous materials response activities.

Planning the Response
Reviewing the Proposed Decontamination Plan

S.O.-8
NFPA 8-3.6
OSHA S.O.-A

Given a site-specific decontamination plan by the hazardous materials branch officer or incident commander for a simulated hazardous materials incident, review the plan to identify safety considerations prior to plan implementation.

S.O.-8.1
NFPA 8-3.6.1
OSHA S.O.-A

Identify the advantages and limitations and describe an example where each of the following decontamination methods would be used:
(a)Absorption
(b)Adsorption
(c)Chemical degradation
(d)Dilution
(e)Disposal
(f)Evaporation
(g)Neutralization
(h)Solidification
(i)Vacuuming
(j)Washing

S.O.-8.2
NFPA 8-3.6.2
OSHA S.O.-A

Identify how personnel, personal protective equipment, apparatus, tools, and equipment become contaminated, as well as the importance and limitations of decontamination procedures.

S.O.-8.3
NFPA 8-3.6.3
OSHA S.O.-A

Explain the need for decontamination procedures at hazardous materials incidents.

S.O.-8.4
NFPA 8-3.6.4
OSHA S.O.-A

Identify three sources of technical information for selecting appropriate decontamination procedures and identify how to contact those sources in an emergency.

S.O.-8.5
NFPA 8-3.6.5
OSHA S.O.-A

Identify the considerations associated with the placement, location, and setup of the decontamination corridor.

S.O.-8.6
NFPA 8-3.6.6
OSHA S.O.-A

Identify the decontamination procedures as defined by the authority having jurisdiction for personnel and personal protective equipment at hazardous materials incidents.

S.O.-8.7
NFPA 8-3.6.7
OSHA S.O.-A

Given three reference sources and a simulated hazardous materials incident involving two or more different chemicals, develop a site-specific personnel decontamination plan that is consistent with the local emergency response plan and the organization's standard operating guidelines.

Planning the Response
Ensuring Provision of Proper Emergency Medical Services

S.O.-9
NFPA 8-3.7
OSHA S.O.-A

Given a simulated hazardous materials incident, review the emergency medical services plan to ensure that response personnel are provided medical care.

S.O.-9.1
NFPA 8-3.7.1
OSHA S.O.-A

Identify the elements required in an emergency medical services plan.

S.O.-9.2
NFPA 8-3.7.2
OSHA S.O.-A

Identify the importance of an on-site medical monitoring program.

S.O.-9.3
NFPA 8-3.7.3
OSHA S.O.-A

Identify three resources for the transportation and care of the injured persons exposed to hazardous materials.

Implementing the Planned Response
Performing the Duties of the Hazardous Materials Branch Safety Officer

S.O.-10
NFPA 8-4.1
OSHA S.O.-A,B,C

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, perform the duties of their position in a manner consistent with the local emergency response plan, the organization's standard operating procedures, and safety considerations.

S.O.-10.1
NFPA 8-4.1.1
OSHA S.O.-A,B,C

Identify the duties of the hazardous materials branch safety officer as defined in the organization's standard operating procedures.

S.O.-10.2
NFPA 8-4.1.2
OSHA S.O.-A,B,C

Demonstrate proper performance of the duties of the hazardous materials branch safety officer as defined in the organization's standard operating procedures.

Implementing the Planned Response
Monitoring Safety of Response Personnel

S.O.-11 NFPA 8-4.2 *OSHA S.O.-A,B*	Given a simulated hazardous materials incident and safety considerations, ensure that personnel perform their tasks in a safe manner by identifying the safety considerations for the control functions identified in the plan of action.
S.O.-11.1 NFPA 8-4.2.1 *OSHA S.O.-A,B*	Identify the safe operating practices that are required to be followed at a hazardous materials incident as stated in the local emergency response plan and the organization's standard operating procedures.
S.O.-11.2 NFPA 8-4.2.2 *OSHA S.O.-A,B*	Identify how the following factors influence heat and cold stress for hazardous materials response personnel: (a)Activity levels (b)Duration of entry (c)Environmental factors (d)Hydration (e)Level of PPE (f)Physical fitness
S.O.-11.3 NFPA 8-4.2.3 *OSHA S.O.-A,B*	Identify the methods that will minimize the potential harm from heat and cold stress.
S.O.-11.4 NFPA 8-4.2.4 *OSHA S.O.-A,B*	Identify the safety considerations that will minimize the psychological and physical stresses on personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.
S.O.-11.5 NFPA 8-4.2.5 *OSHA S.O.-A,B*	Describe five conditions where it would be prudent to withdraw from a hazardous materials incident.

Implementing the Planned Response
Conducting Safety Briefings

S.O.-12 NFPA 8-4.3 *OSHA S.O.-B,C*	Given a simulated hazardous materials incident and safety considerations, conduct safety briefings for personnel performing the control functions identified in the plan of action and demonstrate the proper procedure for conducting a safety briefing to personnel for an incident involving one of the hazardous materials and its container identified in S.O.-2.8(NFPA 8-2.1.8), as specified by the organization's standard operating procedures.

Implementing the Planned Response
Implementing and Enforcing Safety Considerations

S.O.-13 NFPA 8-4.4 *OSHA S.O.-B,C*	Given a simulated hazardous materials incident and safety considerations, assist the incident commander, the incident safety officer, and the hazardous materials branch officer in implementing and enforcing the safety considerations.
S.O.-13.1 NFPA 8-4.4.1 *OSHA S.O.-B,C*	Identify whether the boundaries of the established control zones are clearly marked, consistent with the safety considerations, and are being maintained.
S.O.-13.2 NFPA 8-4.4.2 *OSHA S.O.-B,C*	Identify whether the on-site medical monitoring that are required by the authority having jurisdiction is being performed.

S.O.-13.3	NFPA 8-4.4.3 *OSHA S.O.-B,C*	Given an entry team, a backup team, and a decontamination team wearing personal protective clothing and equipment, identify that each team is properly protected and prepared to safely perform its assigned tasks.
S.O.-13.3.1	NFPA 8-4.4.3.1 *OSHA S.O.-B,C*	Identify whether the selection of clothing and equipment is consistent with safety considerations.
S.O.-13.3.2	NFPA 8-4.4.3.2 *OSHA S.O.-B,C*	Identify whether each team has examined the clothing for barrier integrity and the equipment to ensure proper working order.
S.O.-13.3.3	NFPA 8-4.4.3.3 *OSHA S.O.-B,C*	Identify whether protective clothing and equipment have been donned in accordance with the organization's standard operating procedures and the manufacturer's recommendations.
S.O.-13.4	NFPA 8-4.4.4 *OSHA S.O.-B,C*	Identify whether each person entering the hot zone has a specific task assignment, understands the assignment, is properly trained to perform the assigned task(s), and is working with a designated partner at all times during the assignment.
S.O.-13.5	NFPA 8-4.4.5 *OSHA S.O.-B,C*	Identify whether a backup team with the appropriate level of personal protective equipment is prepared at all times for immediate entry into the hot zone during entry team operations.
S.O.-13.6	NFPA 8-4.4.6 *OSHA S.O.-B,C*	Identify whether the decontamination process specified in the safety considerations is in place before any entry into the hot zone.
S.O.-13.7	NFPA 8-4.4.7 *OSHA S.O.-B,C*	Identify that each person exiting the hot zone and each tool or piece of equipment is decontaminated in accordance with the safety considerations and the degree of hazardous materials exposure.
S.O.-13.8	NFPA 8-4.4.8 *OSHA S.O.-B,C*	Demonstrate the proper procedure for recording the names of the individuals exiting the hot zone, as specified in the local emergency response plan and the organization's standard operating procedures.
S.O.-13.9	NFPA 8-4.4.9 *OSHA S.O.-B,C*	Identify three safety considerations that can minimize secondary contamination.

Implementing the Planned Response
Maintaining Communications

S.O.-14	NFPA 8-4.5 *OSHA S.O.-B,C*	Given a simulated hazardous materials incident and the safety considerations, maintain routine and emergency communications within the incident command structure at all times during the incident.
S.O.-14.1	NFPA 8-4.5.1 *OSHA S.O.-B,C*	Identify three types of communications systems used at hazardous materials incident sites.
S.O.-14.2	NFPA 8-4.5.2 *OSHA S.O.-B,C*	Identify whether each person assigned to work in the hot zone understands the emergency alerting and response procedures specified in the safety considerations prior to entry into the hot zone.

Implementing the Planned Response
Monitoring Status Reports

S.O.-15
NFPA 8-4.6
OSHA S.O.-B,C

Given a simulated hazardous materials incident and the safety considerations, monitor routine and emergency communications within the incident command structure at all times during the incident and identify whether entry team members regularly communicate the status of their work assignment to the hazardous materials branch officer.

Implementing the Planned Response
Implementing Exposure Monitoring

S.O.-16
NFPA 8-4.7
OSHA S.O.-B,C

Given a simulated hazardous materials incident and the safety considerations, assist the incident commander, the incident safety officer, and the hazardous materials branch officer in implementing exposure monitoring.

S.O.-16.1
NFPA 8-4.8
OSHA S.O.-B,C

Identify that exposure monitoring (personnel and environment) as specified in the organization's standard operating procedures and safety considerations is performed.

Evaluating Progress
Identifying Deviations from Safety Considerations and Any Dangerous Situations

S.O.-17
NFPA 8-5.1
OSHA S.O.-B

Given simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, and given simulated deviations from the safety considerations for activities in both the hot and warm zones and simulated dangerous conditions, evaluate the progress of the planned response to ensure that the response objectives are being met safely.

S.O.-17.1
NFPA 8-5.1.1
OSHA S.O.-B

Identify those actions that deviate from the safety considerations or otherwise violate generally accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines.

S.O.-17.2
NFPA 8-1.3
OSHA S.O.-B

Identify dangerous conditions that develop or are identified during work in the hot or warm zones that threaten the safety or health of persons in those zones.

S.O.-17.3
NFPA 8-5.1.3
OSHA S.O.-B

Identify the signs and symptoms of psychological and physical stresses on personnel wearing vapor-protective, liquid splash-protective, and high temperature-protective clothing.

Evaluating Progress
Taking Corrective Actions

S.O.-18
NFPA 8-5.2
OSHA S.O.-B

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, and given simulated deviations from the safety considerations for activities in both the hot and warm zones and simulated dangerous conditions, take such corrective actions as are necessary to ensure the safety and health of persons in the hot and warm zones.

S.O.-18.1
NFPA 8-5.2.1
OSHA S.O.-B

Send emergency communications to, and receive emergency communications from, the incident safety officer, entry team personnel, the hazardous materials branch officer, and others as appropriate regarding safe working practices and conditions.

S.O.-18.1.1 NFPA 8-5.2.1.1 *OSHA S.O.-B*	Given a hazardous situation or condition that has developed or been identified following initial hot zone entry, demonstrate the application of the emergency alerting procedures specified in the safety considerations to communicate the hazard and emergency response information to the affected personnel.
S.O.-18.1.2 NFPA 8-5.2.1.2 *OSHA S.O.-B*	Given a demonstrated emergency alert via hand signal by a member of the entry team operating within the hot zone, identify the meaning of that signal as specified in the safety considerations.
S.O.-18.2 NFPA 8-5.2.2 *OSHA S.O.-B*	Identify the procedures to alter, suspend, or terminate any activity that can be judged to be unsafe, as specified in the local emergency response plan and the organization's standard operating procedures.
S.O.-18.3 NFPA 8-5.2.3 *OSHA S.O.-B*	Demonstrate the procedure for notifying the appropriate individual of the unsafe action and for directing alternative safe actions, in accordance with the safety considerations and the organization's standard operating procedures.
S.O.-18.4 NFPA 8-5.2.4 *OSHA S.O.-B*	Demonstrate the procedure for suspending or terminating an action that could result in an imminent hazard condition, in accordance with the safety considerations and the organization's standard operating procedures.

Terminating the Incident
Providing Reports and Documentation

S.O.-19 NFPA 8-6.1 *OSHA S.O.-C*	Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, complete and submit the reports, documentation, and follow-up required of the hazardous materials branch safety officer.
S.O.-19.1 NFPA 8-6.1.1 *OSHA S.O.-C*	Identify the safety reports and supporting documentation required by the local emergency response plan and the organization's standard operating procedures.
S.O.-19.2 NFPA 8-6.1.2 *OSHA S.O.-C*	Demonstrate the proper completion of the safety reports required by the local emergency response plan and the organization's standard operating procedures.
S.O.-19.3 NFPA 8-6.1.3 *OSHA S.O.-C*	Describe the importance of personnel exposure records.

Terminating the Incident
Debriefing of Hazardous Materials Branch Personnel

S.O.-20 NFPA 8-6.2 *OSHA S.O.-C*	Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, debrief hazardous materials branch personnel regarding site-specific occupational safety and health issues.
S.O.-20.1 NFPA 8-6.2.1 *OSHA S.O.-C*	Identify five health and safety topics to be addressed in an incident debriefing.

S.O.-20.2
NFPA 8-6.2.2
OSHA S.O.-C

Demonstrate the proper procedure for debriefing hazardous materials branch personnel regarding site-specific occupational safety and health areas of concern, as specified in the safety considerations, local emergency response plan, and the organization's standard operating procedures.

Terminating the Incident
Assisting in the Incident Critique

S.O.-21
NFPA 8-6.3
OSHA S.O.-B,C

Given various simulated facility and transportation hazardous materials incidents involving nonbulk and bulk packaging, provide safety and health-related critical observations of the activities that were performed in the hot and warm zones during the incident.

S.O.-21.1
NFPA 8-6.4
OSHA S.O.-B,C

Given the safety considerations and hazardous materials branch safety officer's report for a simulated incident, demonstrate the proper procedure for verbally presenting the following in accordance with the local emergency response plan and the organization's standard operating procedures:

(a) Safety and health-related critical observations of the activities that were performed in the hot and warm zones during the incident
(b) Recorded violations of the safety considerations or generally accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines
(c) Injuries or deaths that occurred as a result of reasonably unforeseen dangerous conditions that developed during the incident
(d) Injuries or deaths that occurred as a result of violations of the safety considerations or generally accepted safe operating practices, organizational policies, or applicable occupational safety and health laws, regulations, codes, standards, or guidelines
(e) The proper course of action(s) that would likely have prevented the injuries or deaths that occurred as a result of the safety violations identified in (d)
(f) Deficiencies or weaknesses in the safety considerations, local emergency response plan, and organizational standard operating procedures that were noted during or following the incident

Hazardous Materials

Incident Response Training Guidelines

OSHA: Specialist and NFPA: Specialist Employee A, and Technician Specialties

General Training Considerations

Introduction

Hazardous materials specialist is a defined response competency in OSHA 29 CFR 1910.120 (q)(6)(iv) but is not a defined competency category in NFPA 472, 1997 edition. However, there is a relationship between the OSHA Specialist competency and the competencies in NFPA 472, 1997 edition, for Private Sector Specialist Employee A and for the Technician Specialties: Tank Car, Cargo Tank, and Intermodal Tank. For this reason, these competencies are grouped together in this section.

Hazardous materials specialists (OSHA) shall be trained to meet all the requirements for the first responder at the awareness level, the first responder at the operations level, and the technician level. In addition, specialists must meet those competencies identified in this section. They also shall meet the training requirements and be provided medical surveillance in accordance with requirements of OSHA, local occupational health and safety regulatory agencies, or the U.S. Environmental Protection Agency (EPA), as appropriate for their jurisdiction.

Definition

Specialists respond to hazardous materials operations and provide support to the incident commander and/or the technician. The duties of specialists, although paralleling those of technicians, require more specific knowledge of hazards common to their area of specialization. They may act as site liaisons with Federal, State, local, and other government authorities, or they may serve as hazardous materials team leader, operations officer or advisor to the incident commander. The specialist's responsibilities may include having to work within the hot zone, and may include performing incident command functions in certain types of incidents.

Audience

Specialists may be members of hazardous material response teams, individual consultants, certain site specialist employees, as defined in Title 29 of the Code of Federal Regulations (CFR), or representatives from organizations that provide technical support to the team. Specialists may be broadly titled as hazardous materials specialists (using OSHA 29 CFR 1910.120 nomenclature) or off-site specialists A (using NFPA 472 nomenclature). They may be called something less generic such as product, container, process, or transportation specialists (such as NFPA 472 Technician with a Tank Car Specialty), or they may have a title referring to a very specific function, such as counter-terrorism explosives specialist or ICBM nuclear warhead specialist.

Under the OSHA and EPA rule, hazardous materials specialists initially shall receive at least 24 hours of training equal to the technician level, training equal to the hazardous materials specialist level competencies for the areas of specialty, and annually thereafter receive refresher training of sufficient content and duration and/or demonstrate continued competency in their area of specialization to the level of their expected involvement.

Methodology Recommendations

Training for hazardous materials specialists is best conducted with a varied mix of classroom instruction using traditional lecture and small activity approaches, field exercises involving group practice in simulated emergencies, and hands-on skill training in doing actual control, confinement, and containment evolutions. Content instruction should be synthesized in student activities requiring analysis of incident information to determine plans of action.

Skill training should be performed on actual containers with simulated releases, using full protective equipment and proper response tools. Skill training should include instructor modeling, student walk-throughs, and student practice under stress until competency is achieved. Proper critiques and corrective instruction are essential. For hazardous materials specialists who may be required to command the incident response, field exercises or large group incident scene simulations are optimal for overall command structure practice, to develop effective incident management skills.

Refresher training should focus on practice in the warm and hot zones of a simulated emergency and should include (1) competency retesting of all response skills; (2) technical information updates; (3) critique of operational decision-making using simulated emergencies; and (4) critique of ICS performance and communication skills using simulated emergencies.

Federal Requirements

For Hazardous Materials Specialist Training

OSHA establishes the following training requirements for hazardous materials specialists. Length of training and method of testing are not specified, but hazardous materials specialists must have received training at the awareness, operations, and technician levels as well as at the specialist level. Employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(6)(iv)
HAZARDOUS MATERIALS SPECIALIST

(iv) Hazardous materials specialist. Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local and other government authorities in regards to site activities. Hazardous materials specialists shall have competency in the following areas and the employer shall so certify:

- *(A) Know how to implement the local emergency response plan*
- *(B) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment*
- *(C) Know the state emergency response plan*
- *(D) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist*
- *(E) Understand in-depth hazard and risk assessment techniques*
- *(F) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available*
- *(G) Be able to determine and implement decontamination procedures.*
- *(H) Have the ability to develop a site safety and control plan*
- *(I) Understand chemical, radiological and toxicological terminology and behavior*

For hazardous materials specialists, required training can be translated directly into the following sample objectives:

Identification	*Sample **Required** Training Objectives*
OSHA HMSPEC-A	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, describe the steps to implement the local emergency response plan.
OSHA HMSPEC-B	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate an understanding of the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.
OSHA HMSPEC-C	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, describe the State emergency response plan.
OSHA HMSPEC-D	Given a simulated incident involving hazardous materials, select and demonstrate use of proper specialized chemical personal protective equipment.

Required Training

OSHA HMSPEC-E	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate an understanding of in-depth hazard and risk assessment techniques, and demonstrate providing technical advice or assistance regarding the hazards of the substance present and potential magnitude of the incident.
OSHA HMSPEC-F	Given a simulated incident involving hazardous materials, containers, and releases within the specialist's area of expertise, demonstrate specialized control, containment, and/or confinement operations.
OSHA HMSPEC-G	Given a simulated incident involving hazardous materials within the specialist's area of technical expertise, demonstrate the ability to determine and implement decontamination procedures.
OSHA HMSPEC-H	Demonstrate the ability to develop a site safety and control plan.
OSHA HMSPEC-I	Define chemical, radiological and toxicological terms and describe chemical, radiological and toxicological materials behavior.

SUMMARY: Hazardous Materials Specialist

OSHA minimum requirement= 24 hours Technician training + Specialist training

Audience	Prerequisites	Training	Refresher
Very narrow. Prospective hazardous materials team leaders or personnel who are designated in response plans as the definitive response resource for specific products or types of hazardous materials emergencies.	1.1st Responder Awareness Training 2. 1st Responder Operations Training 3. Hazardous Materials Technician Training 4 Advanced technical expertise in specific area(s) of hazardous materials.	- Classroom and simulator/field instruction, with emphasis on hands-on training - Competencies: - Knowledge of role of specialist within incident command system and responsibilities within employer's emergency response plan and the State emergency response plan. - Knowledge of hazardous materials terminology and behavior, and ability to perform in depth hazard and risk assessment - Ability to perform specialized control, containment and/or confinement techniques - Ability to select and use specialized personal protective equipment - Ability to implement decontamination procedures. - Ability to develop a site safety and control plan.	1. Competency retesting of all response skills 2. Technical information updates. 3. Incident scene decision-making using simulated emergencies.

Recommended Training

For Hazardous Materials Specialist

The following training objectives are recommended for Hazardous Materials Specialist training. The sources for this material are:
1) NFPA 472, Chapter 6: Competencies for Private Sector Specialist Employees, Section 6.4: Private Sector Specialist Employee A;
2) NFPA 472, Chapter 9: Competencies for the Technician with a Tank Car Specialty;
3) NFPA 472, Chapter 10: Competencies for the Technician with a Cargo Tank Specialty; and
4) NFPA 472, Chapter 11: Competencies for the Technician with an Intermodal Tank Specialty.

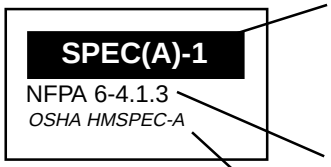
In order to retain the integrity of the NFPA 472 citations, the following identifications are used for the recommended objectives:

Objective ID	*Source*
SPEC(A)	Private Sector Specialist Employee A
TANK	Technician with a Tank Car Specialty
CARGO	Technician with a Cargo Tank Specialty
INTML	Technician with an Intermodal Tank Specialty

Hazardous materials specialist is a defined response competency in OSHA 29 CFR 1910.120 (q)(6)(iv) but is not a defined competency category in NFPA 472, 1997 edition. However, there is a relationship between the OSHA Specialist competency and the competencies in NFPA 472, 1997 edition, for Private Sector Specialist Employee A and for the Technician Specialties: Tank Car, Cargo Tank, and Intermodal Tank. To assist in assessing course compliance with OSHA 1910.120, the relationships between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.

In general, these recommended objectives do not constitute an increased level of training from that minimally required by OSHA for Haz Mat Specialist. Rather, these recommended objectives provide greater depth of definition of student competency for specific hazards, containers, and/or specific responder roles. To assist in assessing course compliance with OSHA 1910.120(q)(6)(iv), the relationships between these objectives and the OSHA requirements are noted. References to OSHA are abbreviated as noted.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as SPEC(A)-1.1) indicate enabling objectives that support the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA 29 CFR 1910.120 (q) (6) (iv) are abbreviated as OSHA HMSPEC A to I.

Private Sector Specialist Employee A
(Reference: NFPA 472, Chapter 6)

Those persons who are specifically trained to handle incidents involving chemicals or containers for chemicals used in their organization's area of specialization. Consistent with the organization's emergency response plan and standard operating procedures, the private sector specialist employee A shall be able to analyze an incident involving chemicals within their organization's area of specialization, plan a response to that incident, implement the planned response within the capabilities of the resources available, and evaluate the progress of the planned response.

In addition to being competent at the private sector specialist employee C level and the hazardous materials technician level, the private sector specialist employee A shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
SPEC(A)-1 NFPA 6-4.1.3 *OSHA HMSPEC-A to I*	Given a hazardous materials incident scenario, define the role and responsibilities of private sector specialist employee A.
SPEC(A)-2 NFPA 6-4.1.3(a) *OSHA HMSPEC-B,E,I*	Given a simulated incident involving hazardous materials within the individual area of specialization, analyze an incident involving chemicals and containers for chemicals used in their organization's area of specialization to determine the magnitude of the incident.
SPEC(A)-2.1 NFPA 6-4.1.3(a)1 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to survey an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization to: (a)Identify the containers involved (b)Identify or classify unknown materials (c)Verify the identity of the chemicals
SPEC(A)-2.2 NFPA 6-4.1.3(a)2 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to collect and interpret hazard and response information from printed resources, technical resources, computer data bases, and monitoring equipment for chemicals used in his or her organization's area of specialization.
SPEC(A)-2.3 NFPA 6-4.1.3(a)3 *OSHA HMSPEC-E*	Demonstrate the ability to determine the extent of damage to containers of chemicals used in his or her organization's area of specialization.
SPEC(A)-2.4 NFPA 6-4.1.3(a)4 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to predict the likely behavior of the chemicals and containers for chemicals used in his or her organization's area of specialization.
SPEC(A)-2.5 NFPA 6-4.1.3(a)5 *OSHA HMSPEC-B,E,I*	Demonstrate the ability to estimate the potential outcomes of an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.
SPEC(A)-3 NFPA 6-4.1.3(b) *OSHA HMSPEC-A,F,H*	Given a simulated incident involving hazardous materials within the individual area of specialization, plan a response (within the capabilities of available resources) to an incident involving chemicals and containers for chemicals used in their organization's area of specialization.
SPEC(A)-3.1 NFPA 6-4.1.3(b)1 *OSHA HMSPEC-A,F,H*	Demonstrate the ability to identify the response objectives for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.2
NFPA 6-4.1.3(b)2
OSHA HMSPEC-A,F,H

Demonstrate the ability to identify the potential action options for each response objective for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.3
NFPA 6-4.1.3(b)3
OSHA HMSPEC-D

Demonstrate the ability to select the personal protective equipment required for a given response option for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.4
NFPA 6-4.1.3(b)4
OSHA HMSPEC-G

Demonstrate the ability to select the appropriate decontamination procedures, as necessary, for an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization.

SPEC(A)-3.5
NFPA 6-4.1.3(b)5
OSHA HMSPEC-A,F,H

Demonstrate the ability to develop a plan of action (within the capabilities of the available resources), including safety considerations, for handling an incident involving chemicals and containers for chemicals used in his or her organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-4
NFPA 6-4.1.3(c)
OSHA HMSPEC-F

Given a simulated incident involving hazardous materials within the individual area of specialization, implement the planned response (as developed with the incident commander) to an incident involving chemicals and containers for chemicals used in their organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-4.1
NFPA 6-4.1.3(c)1
OSHA HMSPEC-D

Demonstrate the ability to don, work in, and doff appropriate personal protective equipment provided by their organization for use with chemicals used in their organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-4.2
NFPA 6-4.1.3(c)2
OSHA HMSPEC-F

Demonstrate the ability to perform control functions, as agreed upon with the incident commander, for chemicals and containers for chemicals used in their organization's area of specialization consistent with their organization's emergency response plan and standard operating procedures.

SPEC(A)-5
NFPA 6-4.1.3(d)
OSHA HMSPEC-A,F,H

Given a simulated incident involving hazardous materials within the individual area of specialization, to evaluate the results of implementing the planned response to an incident involving chemicals and containers for chemicals used in their organization's area of specialization.

Technician with a Tank Car Specialty
(Reference: NFPA 472, Chapter 9)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged tank cars, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

Note that NFPA 472, Chapter 9, is **not** intended as a mandate that hazardous materials response teams must include technicians with a tank car specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 4, are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of tank cars.

In addition to being competent at the hazardous materials technician level, the technician with a tank car specialty shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
TANK-1 NFPA 9-1.3 *OSHA HMSPEC-A-I*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of technician with a tank car specialty.
TANK-1.1 NFPA 9-1.3(a) *OSHA HMSPEC-E*	Describe the responsibility to analyze a hazardous materials incident involving tank cars to determine the magnitude of the problem in terms of outcomes.
TANK-1.1.1 NFPA 9-1.3(a)1 *OSHA HMSPEC-E*	Identify the responsibility to determine the type and extent of damage to tank cars.
TANK-1.1.2 NFPA 9-1.3(a)2 *OSHA HMSPEC-E*	Identify the responsibility to predict the likely behavior of tank cars and their contents in an emergency.
TANK-1.2 NFPA 9-1.3(b) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to plan a response for an emergency involving tank cars within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
TANK-1.2.1 NFPA 9-1.3(b)1 *OSHA HMSPEC-A,C,D,E,F*	Identify the responsibility to determine the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving tank cars.
TANK-1.2.2 NFPA 9-1.3(b)2 *OSHA HMSPEC-A,C,D,E,F*	Identify the responsibility to ensure that the options are within the capabilities and competencies of available personnel, personal protective equipment, and control equipment.
TANK-1.3 NFPA 9-1.3(c) *OSHA HMSPEC-F*	Describe the responsibility to implement the planned response to a hazardous materials incident involving tank cars.

Analyzing the Incident
Determining the Type and Extent of Damage to Tank Cars

TANK-2
NFPA 9-2.1
OSHA HMSPEC-B,E

Given examples of damaged tank cars, describe the type and extent of damage to each tank car and its fittings.

TANK-2.1
NFPA 9-2.1.1
OSHA HMSPEC-B,E

Given the specification mark for a tank car and the appropriate reference materials, describe the car's basic construction and features.

TANK-2.2
NFPA 9-2.1.2
OSHA HMSPEC-B,E

Point out the "B" end of the car.

TANK-2.3
NFPA 9-2.1.3
OSHA HMSPEC-B,E

Given examples of various tank cars, point out and explain the design and purpose of each of the following tank car components, when present.
(a)Tank, including shell, and head
(b)Head shield
(c)Jacket
(d)Lining/cladding
(e)Heater coils – interior vs. exterior
(f)Underframe – continuous vs. stub sill
(g)Shelf couplers
(h)Body bolster
(i)Trucks (pin and bowl)

TANK-2.4
NFPA 9-2.1.4
OSHA HMSPEC-B,E

Given examples of tank cars (some jacketed; some not jacketed), point out the jacketed tank cars.

TANK-2.5
NFPA 9-2.1.5
OSHA HMSPEC-B,E

Describe the difference between "insulation" and "thermal protection" on tank cars.

TANK-2.6
NFPA 9-2.1.6
OSHA HMSPEC-B,E

Describe the difference between "jacketed" and "sprayed-on" thermal protection on tank cars.

TANK-2.7
NFPA 9-2.1.7
OSHA HMSPEC-B,E

Describe the difference between "interior" and "exterior" heater coils on tank cars.

TANK-2.8

NFPA 9-2.1.8
OSHA HMSPEC-B,E

Given examples of various fittings arrangements for pressure, nonpressure, cryogenic, and CO_2 tank cars (including examples of each of the following fittings), point out and explain the design, construction, and operation of each of the following fittings, when present:

(a)Fittings for loading and unloading tank cars, including the following:
1. Bottom outlet valves (top operated with stuffing box, bottom operated — internal or external ball, wafersphere)
2. Liquid valve/vapor valve (ball vs. plug type)
3. Excess flow valve
4. Air valve
5. Bottom outlet nozzle
6. Quick fill hole cover
7. Flange for manway, valves, etc.
8. CO_2 tank car fittings
9. Cryogenic liquid tank car fittings

(b)Fittings for pressure relief, including the following:
1. Safety relief devices (safety valve, safety vent, combination safety valve)
2. Pressure regulators on CO_2 cars and liquefied atmospheric gases in cryogenic liquid tank cars
3. Staged safety relief system for a CO_2 car
4. Vacuum relief valve (negative pressure or vacuum)

(c)Fittings for gauging, including the following:
1. Open gauging devices, e.g., slip tube
2. Closed gauging devices, e.g., magnetic
3. Other gauging devices (T-bar, long/short pole)

(d)Miscellaneous fittings, including the following:
1. Thermometer well
2. Sample line
3. Manway, manway cover plate, hinged and bolted manway cover, protective housing
4. Washout
5. Sump

TANK-2.9

NFPA 9-2.1.9
OSHA HMSPEC-B,E

Given examples of various fitting arrangements on tank cars (including CO_2 and cryogenic liquid tank cars) with the following fittings included, point out the location(s) where each fitting is likely to leak and a reason for the leak:

(a)Bottom outlet valve/top-operated bottom outlet valve (with stuffing box)
(b)Liquid valve/vapor valve (ball vs. plug type)
(c)Air valve
(d)Bottom outlet nozzle
(e)Quick fill hole cover
(f)Flange for manway, valves, etc.
(g)Safety relief valve
(h)Safety vent (with rupture/frangible) disk
(i)Combination safety valve
(j)Pressure regulators on CO_2 cars and liquefied atmospheric gases in cryogenic liquid tank cars
(k)Vacuum relief valve (negative pressure or vacuum)
(l)Open gauging devices, e.g., slip tube
(m)Closed gauging devices, e.g., magnetic
(n)Thermometer well
(o)Sample line
(p)Manway, manway cover plate, hinged and bolted manway cover, protective housing
(q)Washout

TANK-2.10
NFPA 9-2.1.10
OSHA HMSPEC-B,E

Given examples of each of the following types of tank car damage, identify the type of damage:
(a)Crack
(b)Score, gouge, wheel burn, rail burn
(c)Puncture
(d)Flame impingement
(e)Dent
(f)Corrosion

TANK-2.11
NFPA 9-2.1.11
OSHA HMSPEC-B,E

Given examples (actual or simulated) of scores, gouges, wheel burns, and rail burns, perform each of the following tasks:
(a)Use a depth gauge to measure the depth of each score, gouge, wheel burn, and rail burn
(b)Point out where each score, gouge, wheel burn, and rail burn crosses a weld, if that condition exists
(c)Measure the depth of the weld metal removed for any point where the score, gouge, wheel burn, and rail burn crosses a weld
(d)Given examples (actual or simulated) of where a score, gouge, wheel burn, and rail burn crosses a weld, determine if the "heat-affected zone" has been damaged

TANK-2.12
NFPA 9-2.1.12
OSHA HMSPEC-B,E

Given examples (actual or simulated) of dents and rail burns, perform each of the following tasks:
(a)Use a dent gauge to measure the radius of curvature for each dent or rail burn
(b)Identify those examples that include cracks at the point of minimum curvature

TANK-2.13
NFPA 9-2.1.13
OSHA HMSPEC-B,E

Given examples of damaged tank car fittings, describe the extent of damage to those fittings.

TANK-2.14
NFPA 9-2.1.14
OSHA HMSPEC-B,E

Given examples of tank car tank damage, describe the extent of damage to the tank car tank.

TANK-2.15
NFPA 9-2.1.15
OSHA HMSPEC-B,E

Given a tank car and the appropriate equipment and reference material, determine the pressure in the tank car, using either of the following methods:
(a)A pressure gauge
(b)The temperature of the contents

TANK-2.16
NFPA 9-2.1.16
OSHA HMSPEC-B,E

Given a tank car, use the car's gauging device to determine the amount of lading in it.

Analyzing the Incident
Predicting the Likely Behavior of the Tank Car and its Contents

TANK-3
NFPA 9-2.2
OSHA HMSPEC-B,E

Predict the likely behavior of the tank car and its contents.

TANK-3.1
NFPA 9-2.2.1
OSHA HMSPEC-B,E

Given the following types of tank cars, describe the likely breach/release mechanisms associated with each type.
(a)Nonpressure tank cars
(b)Pressure tank cars
(c)Cryogenic liquid tank cars
(d)High-pressure tube cars
(e)Pneumatically unloaded covered hopper cars

TANK-3.2
NFPA 9-2.2.2
OSHA HMSPEC-B,E

Describe the difference in the following types of construction materials used in tank cars and their significance in assessing tank damage:
(a)Carbon steel
(b)Alloy steel
(c)Aluminum

TANK-3.3
NFPA 9-2.2.3
OSHA HMSPEC-B,E

Discuss the significance of selection of lading for compatibility with tank car construction material.

TANK-3.4
NFPA 9-2.2.4
OSHA HMSPEC-B,E

Describe the significance of “lining” and “cladding” on tank cars in assessing tank damage.

TANK-3.5
NFPA 9-2.2.5
OSHA HMSPEC-B,E

Describe the significance of the jacket on tank cars in assessing tank damage.

TANK-3.6
NFPA 9-2.2.6
OSHA HMSPEC-B,E

Describe the significance of “insulation” and “thermal protection” on tank cars in assessing tank damage.

TANK-3.7
NFPA 9-2.2.7
OSHA HMSPEC-B,E

Describe the significance of “jacketed” and “sprayed-on” thermal protection on tank cars in assessing tank damage.

TANK-3.8
NFPA 9-2.2.8
OSHA HMSPEC-B,E

Describe the significance of “interior” and “exterior” heater coils on tank cars in assessing tank damage.

TANK-3.9
NFPA 9-2.2.9
OSHA HMSPEC-B,E

Describe the significance of each of the following types of tank car damage on different types of tank cars in assessing tank damage:
(a)Crack
(b)Score, gouge, wheel burn, rail burn
(c)Puncture
(d)Flame impingement
(e)Dent
(f)Corrosion

TANK-3.10
NFPA 9-2.2.10
OSHA HMSPEC-B,E

Describe the significance of the depth of scores, gouges, wheel burns, and rail burns on tank cars in assessing tank damage.

TANK-3.11
NFPA 9-2.2.11
OSHA HMSPEC-B,E

Describe the significance of scores, gouges, wheel burns, and rail burns crossing a weld on a pressure tank car in assessing tank damage.

TANK-3.12
NFPA 9-2.2.12
OSHA HMSPEC-B,E

Describe the significance of damage to the “heat affected” zone of a weld on a tank car in assessing tank damage.

TANK-3.13
NFPA 9-2.2.13
OSHA HMSPEC-B,E

Describe the significance of a condemning dent of a tank car in assessing tank damage.

TANK-3.14
NFPA 9-2.2.14
OSHA HMSPEC-B,E,I

Given various types of tank cars, describe the significance of pressure increases in assessing tank damage.

TANK-3.15
NFPA 9-2.2.15
OSHA HMSPEC-B,E,I

Given various types of tank cars, describe the significance of the amount of lading in the tank in assessing tank damage.

TANK-3.16
NFPA 9-2.2.16
OSHA HMSPEC-B,E,I

Describe the significance of flame impingement on a tank car.

Planning the Response
Determining the Response Options

TANK-4
NFPA 9-3.1
OSHA HMSPEC-F

Given the analysis of an emergency involving tank cars, determine the response options for each tank car involved.

TANK-4.1
NFPA 9-3.1.1
OSHA HMSPEC-D,F

Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for tank cars:
(a)Transferring liquids and vapors
(b)Flaring liquids and vapors
(c)Venting
(d)Hot and cold tapping
(e)Vent and burn

TANK-4.2
NFPA 9-3.1.2
OSHA HMSPEC-F

Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for leak control techniques on various tank car fittings.

TANK-4.3
NFPA 9-3.1.3
OSHA HMSPEC-F

Describe the effect flaring or venting gas or liquid has on the pressure in the tank (flammable gas or flammable liquid product).

TANK-4.4
NFPA 9-3.1.4
OSHA HMSPEC-F

Describe the inherent risks associated with, procedures for, equipment required to implement, and safety precautions for lifting of tank cars.

TANK-4.5
NFPA 9-3.1.5
OSHA HMSPEC-F

Describe the inherent risks associated with, procedures for, and safety precautions for the following operations:
(a)Shutting off locomotives using the fuel shutoff and the battery disconnect
(b)Setting and releasing brakes on rail cars
(c)Uncoupling rail cars

TANK-4.6
NFPA 9-3.1.6
OSHA HMSPEC-F

Describe the hazards associated with working on railroad property during emergencies.

Implementing the Planned Response

TANK-5
NFPA 9-4.1
OSHA HMSPEC-F

Given an analysis of an emergency involving tank cars and the planned response, implement or oversee the implementation of the selected response options safely and effectively.

TANK-5.1
NFPA 9-4.1.1
OSHA HMSPEC-F

Given a leaking manway cover plate (loose bolts), control the leak.

TANK-5.2
NFPA 9-4.1.2
OSHA HMSPEC-F

Given leaking packing on the following tank car fittings, control the leak:
(a)Gauging device packing nut
(b)Liquid or vapor valve packing nut
(c)Top-operated bottom outlet valve packing gland

TANK-5.3
NFPA 9-4.1.3
OSHA HMSPEC-F

Given an open bottom outlet valve with a defective gasket in the cap, control the leak.

TANK-5.4
NFPA 9-4.1.4
OSHA HMSPEC-F

Given a leaking top-operated bottom outlet valve, close valve completely to control leak.

TANK-5.5
NFPA 9-4.1.5
OSHA HMSPEC-F

Given leaking fittings on a chlorine tank car, use the Chlorine C kit, as appropriate, to control the leak.

TANK-5.6
NFPA 9-4.1.6
OSHA HMSPEC-F

Given the following types of leaks on various types of tank cars, plug or patch those leaks:
(a)Puncture
(b)Irregular-shaped hole
(c)Cracks, splits, or tears

TANK-5.7
NFPA 9-4.1.7
OSHA HMSPEC-F

Given the appropriate equipment and resources, demonstrate the following:
(a)Transferring of liquids and vapors
(b)Flaring of liquids and vapors
(c)Venting

TANK-5.8
NFPA 9-4.1.8
OSHA HMSPEC-F

Given the appropriate resources, perform the following tasks:
(a)Shut off locomotives using the fuel shutoff and the battery disconnect
(b)Set and release brakes on rail cars
(c)Uncouple rail cars

TANK-5.9
NFPA 9-4.1.9
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from tank cars, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
(a)Selection of proper equipment
(b)Sequence of bonding and grounding connections
(c)Proper testing of bonding and grounding connections

TANK-5.10
NFPA 9-4.1.10
OSHA HMSPEC-F

Given a simulated flammable liquid spill from a tank car, describe the procedures for site safety and fire control during cleanup and removal operations.

Technician with a Cargo Tank Specialty
(Reference: NFPA 472, Chapter 10)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged cargo tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

Note that NFPA 472, Chapter 10, is **not** intended as a mandate that hazardous materials response teams must include technicians with a cargo tank specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 4, are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of cargo tanks.

In addition to being competent at the hazardous materials technician level, the technician with a cargo tank specialty shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
CARGO-1 NFPA 10-1.3 *OSHA HMSPEC-A-I*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of Technician with a cargo tank specialty.
CARGO-1.1 NFPA 10-1.3(a) *OSHA HMSPEC-E*	Describe the responsibility to analyze a hazardous materials incident involving cargo tanks to determine the magnitude of the problem in terms of outcomes.
CARGO-1.1.1 NFPA 10-1.3(a)1 *OSHA HMSPEC-E*	Identify the responsibility to determine the type and extent of damage to cargo tanks.
CARGO-1.1.2 NFPA 10-1.3(a)2 *OSHA HMSPEC-E*	Identify the responsibility to predict the likely behavior of cargo tanks and their contents in an emergency.
CARGO-1.2 NFPA 10-1.3(b) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to plan a response for an emergency involving cargo tanks within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving cargo tanks.
CARGO-1.3 NFPA 10-1.3(c) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to implement the planned response to a hazardous materials incident involving cargo tanks.
	Analyzing the Incident ***Determining the Type and Extent of Damage to Cargo Tanks***
CARGO-2 NFPA 10-2.1 *OSHA HMSPEC-B,E*	Given examples of damaged cargo tanks, describe the type and extent of damage to each cargo tank and its fittings.
CARGO-2.1 NFPA 10-2.1.1 *OSHA HMSPEC-B,E*	Given the specification mark for a cargo tank and the appropriate reference materials, describe the tank's basic construction and features.

CARGO-2.2
NFPA 10-2.1.2
OSHA HMSPEC-B,E

Given examples of cargo tanks (some jacketed; some not jacketed), point out the jacketed cargo tanks.

CARGO-2.3
NFPA 10-2.1.3
OSHA HMSPEC-B,E

Given examples of the following types of cargo tank damage, identify the type of damage in each example:
(a)Crack
(b)Scrape, score, gouge, or loss of metal
(c)Puncture
(d)Dent
(e)Flame impingement
(f)Corrosion (internal/external)

CARGO-2.4
NFPA 10-2.1.4
OSHA HMSPEC-B,E

Given simulated damage to an MC-331 cargo tank, determine the extent of damage to the heat-affected zone.

CARGO-2.5
NFPA 10-2.1.5
OSHA HMSPEC-B,E

Given an MC-331 cargo tank containing a liquefied gas, determine the amount of liquid in the tank.

CARGO-2.6
NFPA 10-2.1.6
OSHA HMSPEC-B,E

Given an MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412 cargo tank, point out and explain the design, construction, and operation of each of the following safety devices:
(a)Internal safety valve or external valve with accident protection, including method of activation (air, cable, hydraulic)
(b)Shear-type breakaway piping
(c)Emergency remote shutoff device
(d)Pressure and vacuum relief protection devices
(e)Dome cover design

CARGO-2.7
NFPA 10-2.1.7
OSHA HMSPEC-B,E

Given an MC-331 and MC-338 cargo tank, point out and explain the design, construction, and operation of each of the following safety devices:
(a)Internal safety valve or external valve with accident protection, including method of activation (air, cable, hydraulic)
(b)Excess flow valve
(c)Fusible link and nut assemblies
(d)Emergency remote shutoff device
(e)Pressure relief protection devices

CARGO-2.8
NFPA 10-2.1.8
OSHA HMSPEC-B,E

Given an MC-306/DOT-406 cargo tank, identify and describe the following normal methods of loading and unloading:
(a)Top loading
(b)Bottom loading
(c)Vapor recovery system

CARGO-2.9
NFPA 10-2.1.9
OSHA HMSPEC-B,E

Given the following types of cargo tank trucks and tube trailer, identify and describe the normal methods of loading and unloading:
(a)MC-307/DOT-407
(b)MC-312/DOT-412
(c)MC-331
(d)MC-338
(e)Compressed gas tube trailer

CARGO-2.10
NFPA 10-2.1.10
OSHA HMSPEC-B,E

Describe the normal and emergency methods of activation for the following types of cargo tank truck valve systems:
(a)Air
(b)Cable
(c)Hydraulic

CARGO-2..11
NFPA 10-2.1.11
OSHA HMSPEC-B,E

Given a cargo tank involved in an emergency, identify the factors to be evaluated as part of the cargo tank damage assessment process, including the following:
(a)Type of cargo tank (MC or DOT specification)
(b)Pressurized or nonpressurized
(c)Number of compartments
(d)Type of tank metal (e.g., aluminum vs. stainless steel)
(e)Nature of the emergency (e.g., rollover, vehicle accident, struck by object, etc.)
(f)Container stress applied to the cargo tank
(g)Type and nature of tank damage (e.g., puncture, dome cover leak, valve failure, etc.)
(h)Amount of product both released and remaining in the cargo tank

Analyzing the Incident
Predicting the Likely Behavior of the Cargo Tank and its Contents

CARGO-3
NFPA 10-2.2
OSHA HMSPEC-B,E

Predict the likely behavior of the cargo tank and its contents.

CARGO-3.1
NFPA 10-2.2.1
OSHA HMSPEC-B,E

Given the following types of cargo tanks (including a tube trailer), describe the likely breach/release mechanisms:
(a)MC-306/DOT-406 cargo tanks
(b)MC-307/DOT-407 cargo tanks
(c)MC-312/DOT-412 cargo tanks
(d)MC-331 cargo tanks
(e)MC-338 cargo tanks
(f)Compressed gas tube trailer

CARGO-3.2
NFPA 10-2.2.2
OSHA HMSPEC-B,E

Describe the difference in types of construction materials used in cargo tanks and their significance in assessing tank damage.

CARGO-3.3
NFPA 10-2.2.3
OSHA HMSPEC-B,E

Describe the significance of the jacket on cargo tanks in assessing tank damage.

CARGO-3.4
NFPA 10-2.2.4
OSHA HMSPEC-B,E

Describe the significance of each of the following types of damage on different types of cargo tanks in assessing tank damage:
(a)Crack
(b)Scrape, score, gouge, or loss of metal
(c)Puncture
(d)Dent
(e)Flame impingement
(f)Corrosion (internal/external)

CARGO-3.5
NFPA 10-2.2.5
OSHA HMSPEC-B,E

Given simulated damage to the heat-affected zone on a MC-331 cargo tank, describe the significance of the damage in assessing tank damage.

Planning the Response
Determining the Response Options

CARGO-4
NFPA 10-3.1
OSHA HMSPEC-F

Given the analysis of an emergency involving cargo tanks, determine the response options for each cargo tank involved.

CARGO-4.1
NFPA 10-3.1.1
OSHA HMSPEC-D,F

Given an incident involving a cargo tank, describe the methods, procedures, risks, safety precautions, and equipment that are required to implement spill and leak control procedures.

CARGO-4.2
NFPA 10-3.1.2
OSHA HMSPEC-F

Given an overturned cargo tank, describe the factors to be evaluated for uprighting, including the following:
(a)Type of cargo tank and material of construction
(b)Condition and weight of the cargo tank
(c)Type and nature of stress applied to the cargo tank
(d)Preferred lifting points
(e)Selection of lifting straps and/or air bags
(f)Lifting capabilities of wreckers and cranes
(g)Site safety precautions

Implementing the Planned Response

CARGO-5
NFPA 10-4.1
OSHA HMSPEC-F

Given an analysis of an emergency involving a cargo tank and the planned response, implement or oversee the implementation of the selected response options safely and effectively.

CARGO-5.1
NFPA 10-4.1.1
OSHA HMSPEC-F

Demonstrate the methods for containing the following leaks on liquid cargo tanks (e.g., MC-306/DOT-406, MC-307/DOT-407, and MC-312/DOT-412):
(a)Puncture
(b)Irregular-shaped hole
(c)Split or tear
(d)Dome cover leak
(e)Valves and piping
(f)Pressure relief devices (e.g., vents, burst disc, etc.)

CARGO-5.2
NFPA 10-4.1.2
OSHA HMSPEC-F

Describe the methods for containing the following leaks in MC-331 and MC-338 cargo tanks:
(a)Crack
(b)Failure of safety relief device (e.g., relief valve, burst disc, etc.)
(c)Piping failure

CARGO-5.3
NFPA 10-4.1.3
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from cargo tanks, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
(a)Selection of proper equipment
(b)Sequence of bonding and grounding connections
(c)Proper testing of bonding and grounding connections

CARGO-5.4
NFPA 10-4.1.4
OSHA HMSPEC-F

Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of each of the following:
(a)Portable pumps (air, electrical, gasoline/diesel)
(b)Vehicles with power-take-off (PTO) driven pumps
(c)Pressure transfer
(d)Vacuum trucks

CARGO-5.5
NFPA 10-4.1.5
OSHA HMSPEC-F

Given a simulated overturned MC-306/DOT-406 cargo tank, demonstrate the safe and proper procedures for the following methods of product removal and transfer:
(a)Drilling
(b)Unloading lines
(c)Vapor recovery lines
(d)Internal safety valve

CARGO-5.6
NFPA 10-4.1.6
OSHA HMSPEC-F

Given a simulated overturned MC-307/DOT-407 cargo tank, demonstrate the safe and proper procedures for product removal and transfer.

CARGO-5.7
NFPA 10-4.1.7
OSHA HMSPEC-F

Given a simulated overturned MC-331 cargo tank, demonstrate the safe and proper procedures for product removal and transfer.

CARGO-5.8
NFPA 10-4.1.8
OSHA HMSPEC-F

Given the necessary resources, demonstrate the flaring of a MC-331 flammable gas cargo tank.

CARGO-5.9
NFPA 10-4.1.9
OSHA HMSPEC-F

Given a simulated flammable liquid spill from a cargo tank, describe the procedures for site safety and fire control during cleanup and removal operations.

Technician with an Intermodal Tank Specialty

(Reference: NFPA 472, Chapter 11)

Those persons who provide support to the hazardous materials technician, provide oversight for product removal and movement of damaged intermodal tanks, and act as a liaison between technicians and other outside resources. These technicians are expected to use specialized chemical-protective clothing and specialized control equipment.

Note that NFPA 472, Chapter 11, is **not** intended as a mandate that hazardous materials response teams must include technicians with a intermodal tank specialty in order to perform operations at such incidents. Technicians operating within the bounds of their training as listed in NFPA 472, Chapter 4, are able to intervene at railroad incidents. However, the following additional competencies are provided for those jurisdictions or hazardous materials response teams who desire that some or all of their technicians have more complete and in-depth knowledge of intermodal tanks.

In addition to being competent at the hazardous materials technician level, the technician with an intermodal tank specialty shall be able to achieve the following objectives:

Identification	***Recommended** Training Objectives*
INTML-1 NFPA 11-1.3 *OSHA HMSPEC-A-I*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of technician with an intermodal tank specialty.
INTML-1.1 NFPA 11-1.3(a) *OSHA HMSPEC-E*	Describe the responsibility to analyze a hazardous materials incident involving an intermodal tank to determine the magnitude of the problem in terms of outcomes.
INTML-1.1.1 NFPA 11-1.3(a)1 *OSHA HMSPEC-E*	Identify the responsibility to determine the type and extent of damage to an intermodal tank.
INTML-1.1.2 NFPA 11-1.3(a)2 *OSHA HMSPEC-E*	Identify the responsibility to predict the likely behavior of an intermodal tank and its contents in an emergency.
INTML-1.2 NFPA 11-1.3(b) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to plan a response for an emergency involving an intermodal tank within the capabilities and competencies of available personnel, personal protective equipment, and control equipment by determining the response options (offensive, defensive, and nonintervention) for a hazardous materials emergency involving intermodal tanks.
INTML-1.3 NFPA 11-1.3(c) *OSHA HMSPEC-A,C,D,E,F*	Describe the responsibility to implement the planned response to a hazardous materials incident involving intermodal tanks.
	Analyzing the Incident ***Determining the Type and Extent of Damage to Intermodal Tanks***
INTML-2 NFPA 11-2.1 *OSHA HMSPEC-B,E*	Given examples of damaged intermodal tanks, describe the type and extent of damage to each intermodal tank and its fittings.
INTML-2.1 NFPA 11-2.1.1 *OSHA HMSPEC-B,E*	Given the specification mark for an intermodal tank and the appropriate reference materials, describe the tank's basic construction and features.

INTML-2.2
NFPA 11-2.1.2
OSHA HMSPEC-B,E

Given examples of intermodal tanks (some jacketed; some not jacketed), point out the jacketed intermodal tanks.

INTML-2.3
NFPA 11-2.1.3
OSHA HMSPEC-B,E

Given examples of various intermodal tanks, point out and explain the design and purpose of each of the following intermodal tank components, when present:
(a)Supporting frame
(b)Corner casting
(c)Insulation
(d)Jacket
(e)Heater coils (steam/electric)
(f)Refrigeration unit
(g)Data plate

INTML-2.4
NFPA 11-2.1.4
OSHA HMSPEC-B,E

Given examples of various fittings arrangements for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following fittings, when present:
(a)Spill box
(b)Manhole cover
(c)Air line connection
(d)Top outlet
(e)Bottom outlet valve
(f)Thermometer
(g)Pressure gauge
(h)Gauging device
(i)Liquid or vapor valve
(j)Sample valve
(k)Thermometer well

INTML-2.5
NFPA 11-2.1.5
OSHA HMSPEC-B,E

Given examples of various safety devices for pressure, nonpressure, and cryogenic intermodal tanks, point out and explain the design, construction, and operation of each of the following safety devices, when present:
(a)Safety relief valve
(b)Regulator valve
(c)Rupture disc
(d)Fusible link/nut assemblies
(e)Emergency remote shutoff device
(f)Excess flow valve

INTML-2.6
NFPA 11-2.1.6
OSHA HMSPEC-B,E

Given the following types of intermodal tank damage, identify the type of damage in each example and explain its significance.
(a)Crack
(b)Puncture
(c)Dent
(d)Flame impingement
(e)Corrosion (internal/external)
(f)Metal loss (gouge/score)

INTML-2.7
NFPA 11-2.1.7
OSHA HMSPEC-B,E

Given three examples of damage to the framework of intermodal tanks, describe the damage in each example and explain its significance in the risk analysis process.

INTML-2.8
NFPA 11-2.1.8
OSHA HMSPEC-B,E

Given an intermodal tank involved in an emergency, identify the factors to be evaluated as part of the intermodal tank damage assessment process, including the following:
(a)Type of intermodal tank
(b)Pressurized or nonpressurized
(c)Number of compartments
(d)Type of tank metal
(e)Nature of the emergency
(f)Container stress applied to the intermodal tank
(g)Type and nature of tank damage
(h)Amount of product both released and remaining in the intermodal tank

INTML-2.9
NFPA 11-2.1.9
OSHA HMSPEC-B,E

Given a pressure intermodal tank containing a liquefied gas, determine the amount of liquid in the tank.

INTML-2.10
NFPA 11-2.1.10
OSHA HMSPEC-B,E

Given simulated damage to a pressure intermodal tank, determine the extent of damage to the heat-affected zone.

Analyzing the Incident
Predicting the Likely Behavior of the Intermodal Tank and its Contents

INTML-3
NFPA 11-2.2
OSHA HMSPEC-B,E

Predict the likely behavior of the intermodal tank and its contents.

INTML-3.1
NFPA 11-2.2.1
OSHA HMSPEC-B,E

Given the following types of intermodal tanks, describe the likely breach/release mechanisms:
(a)IMO Type 1/IM-101
(b)IMO Type 2/IM-102
(c)IMO Type 5/DOT-51
(d)DOT-56
(e)DOT-57
(f)DOT-60
(g)Cryogenic (IMO Type 7)

INTML-3.2
NFPA 11-2.2.2
OSHA HMSPEC-B,E

Describe the difference in types of construction materials used in intermodal tanks relative to assessing tank damage.

Planning the Response
Determining the Response Options

INTML-4
NFPA 11-3.1
OSHA HMSPEC-F

Given the analysis of an emergency involving intermodal tanks, determine the response options for each intermodal tank involved.

INTML-4.1
NFPA 11-3.1.1
OSHA HMSPEC-F

Describe the purpose of, potential risks associated with, procedures for, equipment required to implement, and safety precautions for the following product removal techniques for intermodal tanks:
(a)Transferring liquids and vapors (pressure/pump)
(b)Hot tapping
(c)Flaring liquids and vapors

INTML-4.2
NFPA 11-3.1.2
OSHA HMSPEC-F

Describe the purpose of, procedures for, and risks associated with controlling leaks from various fittings on intermodal tanks, including equipment needed and safety precautions.

Implementing the Planned Response

INTML-5
NFPA 11-4.1
OSHA HMSPEC-F

Given an analysis of an emergency involving intermodal tanks and the planned response, implement or oversee the implementation of the selected response options safely and effectively.

INTML-5.1
NFPA 11-4.1.1
OSHA HMSPEC-F

Given leaks from the following fittings on intermodal tanks, control the leaks using proper methods and procedures.
(a)Manway cover
(b)Bottom outlet
(c)Liquid/vapor valve
(d)Safety relief device
(e)Tank

INTML-5.2
NFPA 11-4.1.2
OSHA HMSPEC-F

Demonstrate proper procedures for the following types of emergency product removal:
(a)Gas/liquid transfer (pressure/pump)
(b)Flaring
(c)Venting

INTML-5.3
NFPA 11-4.1.3
OSHA HMSPEC-F

Demonstrate bonding and grounding procedures for the transfer of flammable and combustible products from an intermodal tank, or other products that can give off flammable gases or vapors when heated or contaminated, including the following:
(a)Selection of proper equipment
(b)Sequence of bonding and grounding connections
(c)Proper testing of bonding and grounding connections

INTML-5.4
NFPA 11-4.1.4
OSHA HMSPEC-F

Demonstrate the methods for containing the following leaks on liquid intermodal tanks (e.g., IM-101 and IM-102):
(a)Puncture
(b)Irregular-shaped hole
(c)Split or tear
(d)Dome cover leak
(e)Valves and piping
(f)Pressure relief devices (e.g., vents, burst disc, etc.)

INTML-5.5
NFPA 11-4.1.5
OSHA HMSPEC-F

Describe the methods for containing the following leaks in pressure intermodal tanks:
(a)Crack
(b)Failure of safety relief device (e.g., relief valve, burst disc, etc.)
(c)Piping failure

INTML-5.6
NFPA 11-4.1.6
OSHA HMSPEC-F

Given the following product transfer and recovery equipment, demonstrate the safe and correct application and use of the following:
(a)Portable pumps (air, electrical, gasoline/diesel)
(b)Vehicles with power-take-off (PTO) driven pumps
(c)Pressure transfer
(d)Vacuum trucks

Recommended Training

INTML-5.7 NFPA 11-4.1.7 *OSHA HMSPEC-F*	Given a simulated overturned liquid intermodal tank, demonstrate the safe and proper procedures for product removal and transfer.
INTML-5.8 NFPA 11-4.1.8 *OSHA HMSPEC-F*	Given a simulated overturned pressure intermodal tank, demonstrate the safe and proper procedures for product removal and transfer.
INTML-5.9 NFPA 11-4.1.9 *OSHA HMSPEC-F*	Given the necessary resources, demonstrate the flaring of a pressure flammable gas intermodal tank.
INTML-5.10 NFPA 11-4.1.10 *OSHA HMSPEC-F*	Given a simulated flammable liquid spill from an intermodal tank, describe the procedures for site safety and fire control during cleanup and removal operations.

Hazardous Materials

Incident Response Training Guidelines

OSHA: Specialist Employee and NFPA: Specialist Employee B,C

General Training Considerations

Introduction

Specialist employees shall be trained to the first responder awareness level relative to their area of specialization and shall be trained to those additional competency levels identified in this section. Furthermore, specialist employees shall receive training to meet any applicable Federal (DOT, OSHA, EPA) or local occupational health and safety regulatory agency requirements.

Definition

Specialist employees are defined by OSHA 1910.120(q)(5) as persons who, in the course of their regular job duties, work with and are trained in the handling of specific hazardous substances or chemical-carrying containers and are also prepared to provide advice or assistance within their area of expertise to an incident commander of the hazardous materials team at a hazardous materials incident. Advice and assistance may include gathering, recording, and analyzing information as well as guidance regarding hazards and response options. Assistance also may include working as a technical adviser in the warm and hot zones, if the specialist employee is qualified to do so safely. These specialist functions are addressed somewhat differently in the National Fire Protection Association Standard 472, as Private Sector Specialist Employee C and Private Sector Specialist Employee B.

Private Sector Specialist Employees C are persons having training or educationally acquired expertise in a product, a container, a chemical process, or some procedure of importance to the mitigation of a hazardous materials incident. Private Sector Specialist Employees C may be asked to gather, record, and analyze information. They may serve as consultants and technical advisers to the incident commander or the hazardous materials team, or they may arrange for the provision of such assistance as necessary and related to their area of expertise. They are not expected to work in either the hot or warm zones of an incident area.

Private Sector Specialist Employees B meet the competencies of Private Sector Specialist Employees C and in addition are qualified to assist the response in the warm and hot zones of an incident area and are qualified to provide information on personal protective equipment, decontamination methods, and response evaluation.

Audience

Persons training under this provision shall include those titled specialist employees under Title 29 of the Code of Federal Regulations and those titled Private Sector Specialist Employees C and Private Sector Specialist Employees B using NFPA 472 nomenclature. They may be individual consultants or representatives of organizations that provide technical assistance related to their area of specialization at hazardous materials operations. The knowledge these specialists possess may have been acquired through site-specific hazardous substance training programs; military; public service, or commercial facilities; or educational institutions.

Methodology Recommendations

Typically, specialist employees are responsible for maintaining current technical knowledge in their areas of expertise as part of their normal job responsibilities. Therefore, additional training should focus on applying their technical knowledge to emergency situations. Because specialist employees will have diverse job responsibilities and work schedules, much instruction should be in short, classroom modules or perhaps independent study, with an emphasis on analyzing simulated incidents using existing professional technical expertise and knowledge. For specialist employees who may work in the warm or hot zone, hands-on training to competency in using personal protective clothing is essential. To learn and practice advisory and assistance roles in the incident command system, it also is recommended that local response personnel and area hazardous materials teams work with specialist employees in periodic field exercises.

Specialist employees annually shall receive refresher training of sufficient content and duration or shall demonstrate continued competency in their area of specialization to the level of their expected involvement. Refresher training should focus on hazardous materials incident scenario analysis and practice working as a subordinate and adviser to the response command structure and hazardous materials teams in field exercises simulating emergencies. For specialist employees who will work in warm and hot zones, there should be annual retesting of response skills.

Federal Requirements

For Specialist Employee Training

OSHA establishes the following training requirements for specialist employees. Length of training and method of testing are not specified, but employers are required to ensure that employees demonstrate competency in the skills defined.

OSHA 29 CFR 1910.120(q)(5)
SPECIALIST EMPLOYEES

Employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge, shall receive training or demonstrate competency in the area of their specialization annually.

Required training for specialist employees can be translated directly into the following sample objectives:

Identification	*Sample **Required** Training Objectives*
OSHA SpEMP-1	Given a simulated incident involving hazardous materials within the specialist employee's area of technical expertise, provide technical advice or assistance within the incident command structure regarding assessing the hazards of the substance present and potential magnitude of the incident.
OSHA SpEMP-2	Given a simulated incident involving hazardous materials within the specialist employee's area of technical expertise, provide technical advice within the incident command structure regarding potential response options.
OSHA SpEMP-3	Given a simulated incident involving hazardous materials within the specialist employee's area of technical expertise, provide technical assistance under the incident command structure for control, confinement and containment operations and for incident termination and evaluation activities.

SUMMARY: Specialist Employee

Audience	Prerequisites	Training	Refresher
Very broad. Any persons with existing job expertise in the hazards of specific chemicals or containers, who may be called upon to provide assistance during a hazmat emergency.	1. First Responder Awareness training. 2. Advanced technical expertise in specific hazardous chemicals or containers.	-Classroom, and simulator/field instruction with emphasis on participation in incident response scenarios. Hands-on where appropriate. -Competencies: - Ability to perform in depth hazard and risk assessment within area of expertise. - Ability to recommend response plan options, protective equipment and decontamination requirements, and to assist evaluation. *Additional competencies for those specialist employees whose expertise and assistance may be required in the warm or hot zone:* - Ability to perform specialized control, containment and/or confinement techniques. - Ability to select and use specialized personal protective equipment.	1. Practice providing hazard analysis and response advice during simulated emergencies. *For those specialist employees who may provide assistance in the warm or hot zone:* 2. Competency retesting of response skills and use of personal protective equipment.

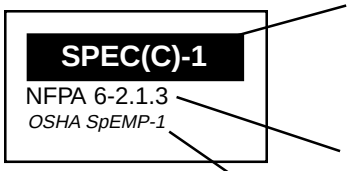
Recommended Training

For Specialist Employee

The following training objectives are recommended for specialist employees. The source for this material is NFPA 472, Chapter 6: Competencies for Private Sector Specialist Employees, section 6-2 (Private Sector Specialist Employee C) and section 6-3 (Private Sector Specialist Employee B). To retain the integrity of the NFPA 472 citations, the groupings of objectives B and C levels are retained. Recommended objectives for Private Sector Specialist Employee C are referred to as SPEC(C) and recommended objectives for Private Sector Specialist Employee B are referred to as SPEC(B).

In general, these recommended objectives are comparable in scope to those minimally required by OSHA. They do not constitute an increased level of training but rather provide greater depth of definition of trainee objectives. The goal of these competencies is to ensure that the specialist employees have the knowledge and skills to safely perform the duties and responsibilities assigned in their organization's emergency response plan and SOP's. To assist in assessing course compliance with OSHA 1910.120(q), the relationships between these objectives and the OSHA requirements are noted.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as SPEC(C)-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA. In some cases, other sources are noted.

This indicates which OSHA requirement this objective supports. References to OSHA 1910.120(q)(5) are abbreviated as OSHA SpEMP 1-3.

Private Sector Specialist Employee C

In addition to being at the first responder awareness level relative to his or her organization's area of specialization, the private sector specialist employee C shall also achieve the following training objectives:

Identification	***Recommended** Training Objectives*
SPEC(C)-1 NFPA 6-2.1.3 *OSHA SpEMP-1,2*	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the Private Sector Specialist Employee C.
SPEC(C)-1.1 NFPA 6-2.1.3(a) *OSHA SpEMP-1*	Describe the responsibility to assist the incident commander in analyzing the magnitude of an emergency involving chemicals or containers for chemicals.
SPEC(C)-1.1.1 NFPA 6-2.1.3(a)1 *OSHA SpEMP-1*	Identify the responsibility to provide information on the hazards and harmful effects of specific chemicals.

SPEC(C)-1.1.2
NFPA 6-2.1.3(a)2
OSHA SpEMP-1

Identify the responsibility to provide information on the characteristics of specific containers for chemicals.

SPEC(C)-1.2
NFPA 6-2.1.3(b)
OSHA SpEMP-2

Describe the responsibility to assist the incident commander in planning a response to an emergency involving chemicals or containers for chemicals.

SPEC(C)-1.2.1
NFPA 6-2.1.3(b)1
OSHA SpEMP-2

Identify the responsibility to provide information on the potential response options for chemicals or containers for chemicals.

Analyzing the Incident
Providing Information on the Hazards and Harmful Effects of Specific Chemicals

SPEC(C)-2
NFPA 6-2.2.1
OSHA SpEMP-1

Given a specific chemical(s) used in his or her organization's area of specialization and the appropriate material safety data sheet (MSDS) or other appropriate resource, advise the incident commander of the chemical's hazards and harmful effects.

SPEC(C)-2.1
NFPA 6-2.2.1.1
OSHA SpEMP-1

Identify the following hazard information from the material safety data sheet (MSDS) or other appropriate resource:
(a)Physical and chemical characteristics
(b)Physical hazards of the chemical (including fire and explosion hazards)
(c)Health hazards of the chemical
(d)Signs and symptoms of exposure
(e)Routes of entry
(f)Permissible exposure limits
(g)Reactivity hazards
(h)Environmental concerns

SPEC(C)-2.2
NFPA 6-2.2.1.2
OSHA SpEMP-1

Identify how to contact CHEMTREC/CANUTEC/SETIQ.

SPEC(C)-2.3
NFPA 6-2.2.1.3
OSHA SpEMP-1

Identify the resources available from CHEMTREC/CANUTEC/SETIQ.

SPEC(C)-2.4
NFPA 6-2.2.1.4
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify additional resources of hazard information, including a method of contact.

Analyzing the Incident
Providing Information on Characteristics of Specific Containers

SPEC(C)-3
NFPA 6-2.2.2
OSHA SpEMP-1

Given examples of facility and transportation containers for chemicals in their organization's area of specialization, advise the incident commander of the characteristics of the containers.

SPEC(C)-3.1
NFPA 6-2.2.2.1
OSHA SpEMP-1

Given examples of various containers for chemicals used in his or her organization's area of specialization, identify each container by name.

SPEC(C)-3.2
NFPA 6-2.2.2.2
OSHA SpEMP-1

Given examples of facility and transportation containers for chemicals in their organization's area of specialization, identify the markings that differentiate one container from another.

SPEC(C)-3.3
NFPA 6-2.2.2.3
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify the resources available that can provide information about the characteristics of the container.

Planning the Response

Providing Information on Potential Response Options for Specific Chemicals

SPEC(C)-4
NFPA 6-2.3.1
OSHA SpEMP-2

Given a specific chemical used in their organization's area of specialization and an appropriate material safety data sheet (MSDS) or other appropriate resource, advise the incident commander of the response information for that chemical.

SPEC(C)-4.1
NFPA 6-2.3.1.1
OSHA SpEMP-2

Given a specific chemical used in their organization's area of specialization and an appropriate (MSDS), obtain the following response information:

(a)Precautions for safe handling, including hygiene practices, protective measures, and procedures for cleanup of spills/leaks

(b)Applicable control measures, including personal protective equipment

(c)Emergency and first aid procedures

SPEC(C)-4.2
NFPA 6-2.3.1.2
OSHA SpEMP-2

Given his or her organization's emergency response plan and SOP's, identify additional resources for obtaining response information.

Private Sector Specialist Employee B

SPEC(B)-1 NFPA 6-3.1.3 *OSHA SpEMP-1,2,3*	Given a simulated incident involving hazardous materials within the individual area of specialization, define the roles and responsibilities of the private sector specialist employee B.
SPEC(B)-1.1 NFPA 6-3.1.3(a) *OSHA SpEMP-1*	Describe the responsibility to assist the incident commander in analyzing the magnitude of an incident involving chemicals or containers for chemicals.
SPEC(B)-1.1.1 NFPA 6-3.1.3(a)1 *OSHA SpEMP-1*	Identify the responsibility to provide and interpret information on the hazards and harmful effects.
SPEC(B)-1.1.2 NFPA 6-3.1.3(a)2 *OSHA SpEMP-1*	Identify the responsibility to provide and interpret information on the characteristics of specific containers.
SPEC(B)-1.1.3 NFPA 6-3.1.3(a)3 *OSHA SpEMP-1*	Identify the responsibility to provide information on concentrations of chemicals from exposure monitoring, dispersion modeling, or any other predictive method.
SPEC(B)-1.2 NFPA 6-3.1.3(b) *OSHA SpEMP-2*	Describe the responsibility to assist the incident commander in planning a response to an incident involving chemicals or containers for chemicals.
SPEC(B)-1.2.1 NFPA 6-3.1.3(b)1 *OSHA SpEMP-2*	Identify the responsibility to provide information on the potential response options and their consequences for specific chemicals or containers for chemicals.
SPEC(B)-1.2.2 NFPA 6-3.1.3(b)2 *OSHA SpEMP-2*	Identify the responsibility to provide information on the personal protective equipment requirements for a specific chemical.
SPEC(B)-1.2.3 NFPA 6-3.1.3(b)3 *OSHA SpEMP-2*	Identify the responsibility to provide information on the decontamination methods for a specific chemical.
SPEC(B)-1.2.4 NFPA 6-3.1.3(b)4 *OSHA SpEMP-1,2,3*	Identify the responsibility to provide information on the federal/provincial regulations that relate to the handling and disposal of a specific chemical.
SPEC(B)-1.2.5 NFPA 6-3.1.3(b)5 *OSHA SpEMP-2,3*	Identify the responsibility to develop a plan of action (within the capabilities of the available resources), including safety considerations, for handling chemicals or containers for chemicals consistent with their organization's emergency response plan and standard operating procedures.
SPEC(B)-1.3 NFPA 6-3.1.3(c) *OSHA SpEMP-3*	Describe the responsibility to implement the planned response, as developed with the incident commander, for chemicals or containers for chemicals, consistent with their organization's emergency response plan and standard operating procedures and within the capabilities of the available resources.

SPEC(B)-1.3.1
NFPA 6-3.1.3(c)1
OSHA SpEMP-3

Identify the responsibility to perform response options specified in the plan of action, as agreed upon with the incident commander and consistent with their organization's emergency response plan and standard operating procedures (within the capabilities of the available resources).

SPEC(B)-1.3.2
NFPA 6-3.1.3(c)2
OSHA SpEMP-3

Identify the responsibility to don, work in, and doff personal protective equipment needed to implement the response options.

SPEC(B)-1.4
NFPA 6-3.1.3(d)
OSHA SpEMP-2,3

Describe the responsibility to assist the incident commander to evaluate the results of implementing the planned response.

SPEC(B)-1.4.1
NFPA 6-3.1.3(d)1
OSHA SpEMP-2,3

Identify the responsibility to provide feedback on the effectiveness of the response options taken.

SPEC(B)-1.4.2
NFPA 6-3.1.3(d)2
OSHA SpEMP-2,3

Identify the responsibility to provide reporting and subsequent documentation of the incident involving chemicals as required.

Analyzing the Incident

Providing and Interpreting Information on Hazards of Specific Chemicals

SPEC(B)-2
NFPA 6-3.2.1
OSHA SpEMP-1

Given a specific chemical within their individual area of specialization and an appropriate material safety data sheet (MSDS) or other appropriate resource, advise the incident commander of the chemical's hazards and harmful effects and the potential consequences based on the incident.

SPEC(B)-2.1
NFPA 6-3.2.1.1
OSHA SpEMP-1

Given a specific chemical, identify and interpret the following hazard information:
(a)Physical and chemical characteristics
(b)Physical hazards of the chemical (including fire and explosion hazards)
(c)Health hazards of the chemical
(d)Signs and symptoms of exposure
(e)Routes of entry
(f)Permissible exposure limits
(g)Reactivity hazards
(h)Environmental concerns

SPEC(B)-2.2
NFPA 6-3.2.1.2
OSHA SpEMP-1

Given examples of specific chemicals and the appropriate resources (as identified in their organization's emergency response plan and standard operating procedures), predict the potential behavior of the chemicals based on the damage found, including the consequences of that behavior.

SPEC(B)-2.3
NFPA 6-3.2.1.3
OSHA SpEMP-1

Identify the general types of hazard information available from the other resources identified in their organization's emergency response plan and standard operating procedures.

Analyzing the Incident
Providing Information on Characteristics of Specific Containers

SPEC(B)-3
NFPA 6-3.2.2
OSHA SpEMP-1

Given a container for specific chemicals, advise the incident commander of the characteristics and potential behavior of that container.

SPEC(B)-3.1
NFPA 6-3.2.2.1
OSHA SpEMP-1

Given examples of containers for specific chemicals, identify the purpose and operation of the closures found on those containers.

SPEC(B)-3.2
NFPA 6-3.2.2.2
OSHA SpEMP-1

Given a chemical container, list the types of damage that could occur.

SPEC(B)-3.3
NFPA 6-3.2.2.3
OSHA SpEMP-1

Given examples of containers for specific chemicals and the appropriate resources (as identified in their organization's emergency response plan and standard operating procedures), predict the potential behavior of the containers and the consequences, based on the damage found.

SPEC(B)-3.4
NFPA 6-3.2.2.4
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) knowledgeable in the design, construction, and damage assessment of containers for chemicals.

Analyzing the Incident
Providing Information on Concentrations of Chemicals

SPEC(B)-4
NFPA 6-3.2.3
OSHA SpEMP-1

Given a chemical and the applicable monitoring equipment provided by their organization for that chemical or the available predictive capabilities (e.g., dispersion modeling, exposure modeling), advise the incident commander of the concentrations of the released chemical and the implications of that information to the incident.

SPEC(B)-4.1
NFPA 6-3.2.3.1
OSHA SpEMP-1

Identify the appropriate monitoring equipment for a chemical used in his or her individual area of specialization.

SPEC(B)-4.2
NFPA 6-3.2.3.2
OSHA SpEMP-1

Use the appropriate monitoring equipment provided by their organization to determine the actual concentrations of a specific chemical.

SPEC(B)-4.3
NFPA 6-3.2.3.3
OSHA SpEMP-1

Given information on the concentrations of a chemical used in their organization, interpret the significance of that concentration information to the incident relative to the hazards and harmful effects of the chemical.

SPEC(B)-4.4
NFPA 6-3.2.3.4
OSHA SpEMP-1

Demonstrate field calibration and testing procedures, as necessary, for the monitoring equipment provided by their organization.

SPEC(B)-4.5
NFPA 6-3.2.3.5
OSHA SpEMP-1

Given their organization's emergency response plan and standard operating procedures, identify the resources (including a method of contact) capable of providing monitoring equipment, dispersion modeling, or monitoring services.

Planning the Response
Providing Information on Potential Response Options and Consequences for Specific Chemicals

SPEC(B)-5
NFPA 6-3.3.1
OSHA SpEMP-2

Given specific chemicals or containers within their individual area of specialization and the appropriate resources, advise the incident commander of the potential response options and their consequences.

SPEC(B)-5.1
NFPA 6-3.3.1.1
OSHA SpEMP-2

Given a specific chemical and an appropriate material safety data sheet (MSDS), identify and interpret the following response information:

(a) Precautions for safe handling, including hygiene practices, protective measures, and procedures for cleanup of spills or leaks

(b) Applicable control measures, including personal protective equipment

(c) Emergency and first aid procedures

SPEC(B)-5.2
NFPA 6-3.3.1.2
OSHA SpEMP-2

Given their organization's emergency response plan and standard operating procedures, identify additional resources for interpreting response information for a chemical.

SPEC(B)-5.3
NFPA 6-3.3.1.3
OSHA SpEMP-2

Describe the advantages and limitations of the potential response options for a specific chemical.

SPEC(B)-5.4
NFPA 6-3.3.1.4
OSHA SpEMP-2

Given their organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) capable of:

(a) Repairing containers for chemicals

(b) Removing the contents of containers for chemicals

(c) Cleanup and disposal of chemicals or containers for chemicals

Planning the Response
Providing Information on Personal Protective Equipment Requirements

SPEC(B)-6
NFPA 6-3.3.2
OSHA SpEMP-3

Given specific chemicals or containers for chemicals within their individual area of specialization and the appropriate resources, advise the incident commander of the appropriate personal protective equipment necessary for various response options.

SPEC(B)-6.1
NFPA 6-3.3.2.1
OSHA SpEMP-3

Given a specific chemical and an appropriate material safety data sheet (MSDS), identify personal protective equipment, including the materials of construction, that will be compatible with that chemical.

SPEC(B)-6.2
NFPA 6-3.3.2.2
OSHA SpEMP-3

Given their organization's emergency response plan and standard operating procedures, identify other appropriate resources (including a method of contact) capable of identifying the personal protective equipment that is compatible with a specific chemical.

SPEC(B)-6.3
NFPA 6-3.3.2.3
OSHA SpEMP-3

Given an incident involving a specific chemical and the response options for that problem, determine whether the personal protective equipment provided by the organization is appropriate for the options presented.

Planning the Response
Providing Information on Decontamination Methods

SPEC(B)-7 NFPA 6-3.3.3 *OSHA SpEMP-3*	Given a specific chemical within their individual area of specialization and the available resources, identify appropriate decontamination methods for various response options.
SPEC(B)-7.1 NFPA 6-3.3.3.1 *OSHA SpEMP-3*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, obtain the potential methods for removing or neutralizing that chemical.
SPEC(B)-7.2 NFPA 6-3.3.3.2 *OSHA SpEMP-3*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, identify the circumstances under which disposal of contaminated equipment would be necessary.
SPEC(B)-7.3 NFPA 6-3.3.3.3 *OSHA SpEMP-3*	Given their organization's emergency response plan and standard operating procedures, identify resources (including a method of contact) capable of identifying potential decontamination methods.

Planning the Response
Providing Information on Handling and Disposal Regulations

SPEC(B)-8 NFPA 6-3.3.4 *OSHA SpEMP-2*	Given a specific chemical within their area of specialization and the available resources, advise the incident commander of the federal or provincial regulations that relate to the handling, transportation, and disposal of that chemical.
SPEC(B)-8.1 NFPA 6-3.3.4.1 *OSHA SpEMP-2*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, identify federal or provincial regulations that apply to the handling, transportation, and disposal of that chemical.
SPEC(B)-8.2 NFPA 6-3.3.4.2 *OSHA SpEMP-2*	Given a specific chemical and a material safety data sheet (MSDS) or other resource, identify the agencies (including a method of contact) responsible for compliance with the federal or provincial regulations that apply to the handling, transportation, and disposal of a specific chemical.
SPEC(B)-8.3 NFPA 6-3.3.4.3 *OSHA SpEMP-2*	Given their organization's emergency response plan and standard operating procedures, identify resources for information pertaining to federal or provincial regulations relative to the handling and disposal of a specific chemical.

Planning the Response
Developing a Plan of Action

SPEC(B)-9 NFPA 6-3.3.5 *OSHA SpEMP-2*	Given a simulated incident involving chemicals or containers used in their individual area of specialization, develop a plan of action (in conjunction with the incident commander), consistent with their organization's emergency response plan and standard operating procedures, for handling chemicals or containers in that incident. The plan of action developed shall be within the capabilities of the available resources and shall include safety considerations.
SPEC(B)-9.1 NFPA 6-3.3.5.1 *OSHA SpEMP-2*	Given the organization's emergency response plan and standard operating procedures, identify the process for development of a plan of action, including safety considerations.

Implementing the Planned Response
Performing Response Options Specified in the Plan of Action

SPEC(B)-10
NFPA 6-3.4.1
OSHA SpEMP-3

Given an assignment by the incident commander in their individual area of specialization, perform the assigned actions consistent with their organization's emergency response plan and standard operating procedures.

SPEC(B)-10.1
NFPA 6-3.4.1.1
OSHA SpEMP-3

Perform assigned tasks consistent with their organization's emergency response plan and standard operating procedures and the available personnel, tools, and equipment (including personal protective equipment), including the following:

(a)Confinement activities
(b)Containment activities
(c)Product removal activities

SPEC(B)-10.2
NFPA 6-3.4.1.2
OSHA SpEMP-1

Identify factors that can affect an individual's ability to perform the assigned tasks.

Implementing the Planned Response
Using Personal Protective Equipment

SPEC(B)-11
NFPA 6-3.4.2
OSHA SpEMP-3

Given an assignment within their individual area of specialization, don, work in, and doff the appropriate personal protective equipment needed to implement the assigned response options, consistent with their organization's emergency response plan and standard operating procedures.

SPEC(B)-11.1
NFPA 6-3.4.2.1
OSHA SpEMP-3

Don, work in, and doff the appropriate respiratory protection and protective clothing for the assigned tasks.

SPEC(B)-11.2
NFPA 6-3.4.2.2
OSHA SpEMP-3

Identify the safety considerations for personnel wearing personal protective equipment, including:

(a)Buddy system
(b)Backup personnel
(c)Symptoms of heat and cold stress
(d)Limitations of personnel working in personal protective equipment
(e)Indications of material degradation of chemical-protective clothing
(f)Physical and psychological stresses on the wearer
(g)Emergency procedures and hand signals

SPEC(B)-11.3
NFPA 6-3.4.2.3
OSHA SpEMP-3

Identify the procedures for cleaning, sanitizing, and inspecting personal protective equipment provided by the organization.

Evaluating Progress
Providing an Evaluation of the Effectiveness of Selected Response Options

SPEC(B)-12
NFPA 6-3.5.1
OSHA SpEMP-3

Given an incident involving specific chemicals or containers for chemicals within their individual area of specialization, advise the incident commander of the effectiveness of the selected response options.

SPEC(B)-12.1
NFPA 6-3.5.1.1
OSHA SpEMP-3

Identify the criteria for evaluating whether or not the selected response options are effective in accomplishing the objectives.

SPEC(B)-12.2 Identify the circumstances when it would be prudent to withdraw from a chemical incident.
NFPA 6-3.5.1.2
OSHA SpEMP-3

Evaluating Progress
Reporting and Documenting the Incident

SPEC(B)-13 Given a simulated incident involving chemicals or containers for chemicals used in their individual area of specialization, complete the reporting and subsequent documentation requirements consistent with their organization's emergency response plan and standard operating procedures.
NFPA 6-3.5.2
OSHA SpEMP-1,2,3

SPEC(B)-13.1 Identify the importance of documentation (including training records, exposure records, incident reports, and critique reports) for an incident involving chemicals.
NFPA 6-3.5.2.1
OSHA SpEMP-1.2

SPEC(B)-13.2 Identify the steps used in keeping an activity log and exposure records.
NFPA 6-3.5.2.2
OSHA SpEMP-1,2

SPEC(B)-13.3 Identify the requirements for compiling incident reports.
NFPA 6-3.5.2.3
OSHA SpEMP-1,2

SPEC(B)-13.4 Identify the requirements for compiling hot zone entry and exit logs.
NFPA 6-3.5.2.4
OSHA SpEMP-2,3

SPEC(B)-13.5 Identify the requirements for compiling personal protective equipment logs.
NFPA 6-3.5.2.5
OSHA SpEMP-2,3

SPEC(B)-13.6 Identify the requirements for filing documents and maintaining records.
NFPA 6-3.5.2.6
OSHA SpEMP-2,3

Hazardous Materials

Incident Response Training Guidelines

Emergency Medical Service Responder Level 1

General Training Considerations

Introduction

Emergency medical service (EMS) responder Level 1 shall be trained to meet the requirements of the first responder at the awareness level, as defined in OSHA 1910.120(q)(6)(i) as well as the competencies recommended in this section. In addition, EMS responder Level 1 shall meet the training requirements of local occupational health and safety regulatory agencies or EPA, as appropriate for their jurisdiction.

In addition to being trained to the first responder awareness level, emergency medical service personnel who respond to hazardous materials incidents should be trained and receive regular continuing education to maintain competence in three areas: emergency medical technology, hazardous materials, and specialized topics such as hazardous materials toxicology, as approved by the authority having jurisdiction. The training program should be a comprehensive competency-based presentation of the required subject material with applicable hands-on sessions that demonstrate the newly acquired skills.

Definition

Emergency medical service responder Level 1 are persons who, in the course of their normal duties, may be called on to perform patient care activities in the cold zone at a hazardous materials incident. EMS responder Level 1 shall provide prehospital care *only* to those individuals who no longer pose a significant risk of secondary contamination, such as decontaminated patients in the cold zone.

Audience

EMS Level 1 training is appropriate for all emergency medical technicians, paramedics, and other health professionals who, in the course of their normal duties, may respond to hazardous materials emergencies either as a first responder or as on-site cold zone support to the incident command structure at an incident scene.

Related Health, Safety, and Performance Standards

OSHA 29 CFR 1910.120
EPA 40 CFR 311
NFPA 472
NFPA 473
NFPA 1561 Standards on Fire Department Incident Management System, 1995 Edition
U.S. Fire Administration Emergency Incident Rehabilitation Guide, FA-114

Recognized U.S. Department of Transportation, State, regional, or local training curricula should constitute the entry-level EMS preparation for continuing hazardous materials training. When a hazardous materials incident occurs, all EMS basic life-support-provider personnel responding should have been trained to the emergency medical technician A level or equivalent.

Appropriate Methodologies

EMS Level 1 training should include a combination of traditional classroom lecture with small-group activities, field exercises involving working with the incident command structure in simulated emergencies, and hands-on psychomotor skill training. Content instruction should focus on contamination hazards, treatment procedures, and incident scene roles and responsibilities. Trainee activities should focus on assessment and analysis of hazards and determination of appropriate procedures. Skill training should focus on implementing procedures. Written and practical examinations are highly recommended to measure achievement in initial training and refresher programs and to support the employer's responsibility that all EMS personnel are trained to competency before being called on to perform at emergencies. Table-top and field exercises should focus on acting out incident scene roles and on implementing procedures in a field environment. Refresher training should be conducted on a yearly basis and focus on technical updates to changes in response protocols, SOP's, and renewal of individual response skills.

General Training Considerations

The following resources are recommended to supplement the training process:

Local Emergency Response Plan
Standard Operating Procedures
Hawley's Condensed Chemical Dictionary, 11th Edition
OSHA 29 CFR 1910.120
Hazardous Chemical Data (U.S. Government)
National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards (U.S. Government)
Emergency Action Guides (Association of American Railroads)
NFPA 471, 472, and 473
Handbook of Toxic and Hazardous Chemicals and Carcinogens
Toxic Gases: First Aid and Medical Treatment
Haz/Mat Injuries (Bradford/Stutz)

SUMMARY: Emergency Medical Services Responder Level 1

Audience	Prerequisites	Training	Refresher
Large training audience. All paramedics and emergency medical technicians who respond to emergencies, including all transportation accidents, that may involve hazmat.	First Responder Awareness training.	- Classroom, physical skills lab, and simulator/field instruction, with emphasis on decision making and treatment. - Competencies: - Assessing incident scene hazards and risks of patient secondary contamination. - Incident scene response planning, including determining personal protective equipment needs and defining roles and responsibilities of EMS Level 1 responder. - Ability to perform EMS Level 1 patient preparation, care, and preparation for transport. - Ability to perform post-incident EMS reporting, documentation, and follow-up.	1. Technical updates. 2. Changes in response protocols and incident command system SOP's. 3. Renewal and retesting of incident scene decision making and cold zone treatment skills.

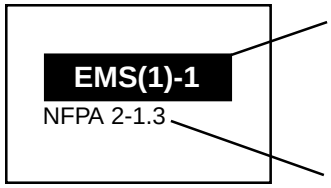
Recommended Training

For EMS Responder Level 1 Training

The following training objectives are recommended for emergency medical service responder Level 1. The primary source for this material is NFPA 473: Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents, Chapter 2 Competencies for EMS/HM Level 1 Responders.

In general, these recommended objectives are comparable in scope and concept to the general requirements of OSHA that all responding personnel be properly trained to perform their assigned roles in a hazardous materials emergency.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as EMS(1)-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA 473, Chapter 2.

Identification	***Recommended** Training Objectives*
EMS(1)-1 NFPA 2-1.3	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the emergency medical service responder Level 1.
EMS(1)-1.1 NFPA 2-1.3(a)	Describe the responsibility of the emergency medical service responder Level 1 to analyze a hazardous materials emergency to determine what risks are present to the provider and the patient.
EMS(1)-1.2 NFPA 2-1.3(b)	Describe the responsibility of the emergency medical service responder Level 1 to plan a response to provide the appropriate level of emergency medical care to persons involved in hazardous materials incidents.
EMS(1)-1.3 NFPA 2-1.3(c)	Describe the responsibility of the emergency medical service responder Level 1 to implement the planned response.
EMS(1)-1.4 NFPA 2-1.3(d)	Describe the responsibility of the emergency medical service responder Level 1 to terminate the incident
	Analyzing the Hazardous Materials Incident
EMS(1)-2 NFPA 2-2.1	Given an emergency involving hazardous materials, determine the hazards to the responder and the patient in that situation.

EMS(1)-2.1
NFPA 2-2.1(a)
Given an emergency involving hazardous materials, assess the nature and severity of the incident (size-up) as they pertain to EMS responsibilities at a hazardous materials incident with evaluation of available resources and a request for any needed assistance.

EMS(1)-2.2
NFPA 2-2.1(b)
Given an emergency involving hazardous materials, evaluate the environmental factors as they affect patient care.

EMS(1)-2.3
NFPA 2-2.1(c)
Identify the information resources available and how to access the following:
(a)Poison Control Center
(b)Medical control
(c)Material safety data sheets
(d)Reference guidebooks
(e)Hazardous materials data bases
(f)Technical information centers (CHEMTREC, NRC, etc.)
(g)Technical specialists
(h)Agency for Toxic Substances and Disease Registry (ATSDR)

EMS(1)-2.4
NFPA 2-2.1(d)
Given a pesticide label, identify and explain the significance of the following:
(a)Name of pesticide
(b)Signal word
(c)EPA registration number
(d)Precautionary statement
(e)Hazard statement
(f)Active ingredient

EMS(1)-3
NFPA 2-2.2
Given a hazardous materials incident with a patient(s), determine the risk of secondary contamination.

EMS(1)-3.1
NFPA 2-2.2(a)
Explain the basic toxicological principles relative to assessment and treatment of victims exposed to hazardous materials, including the following:
(a)Acute and delayed toxicity
(b)Routes of exposure to toxic materials
(c)Local and systemic effects
(d)Dose response as it relates to risk assessment
(e)Synergistic effects
(f)Health hazard as determined by assessing toxicity, exposure, and dose

EMS(1)-3.2
NFPA 2-2.2(b)
Describe how the chemical contamination of patients alters the principles of triage in hazardous materials incidents.

EMS(1)-3.3
NFPA 2-2.2(c)
Explain the need for patient decontamination procedures at hazardous materials incidents.

EMS(1)-3.4
NFPA 2-2.2(d)
Describe how the potential for secondary contamination determines the extent of patient decontamination required.

EMS(1)-3.5 NFPA 2-2.2(e)	Describe the way that personnel, personal protective clothing, apparatus, tools, and equipment become contaminated and the importance and limitations of decontamination procedures.
EMS(1)-3.6 NFPA 2-2.2(f)	Explain the decontamination procedures as defined by the authority having jurisdiction for patients, personnel, personal protective equipment, and apparatus at hazardous materials incidents.
EMS(1)-4	Advise the evaluator of the names of the hospital facilities in the local area capable of handling patients contaminated at a hazardous materials incident and the importance of this information.

Planning the Response

EMS(1)-5 NFPA 2-3.1	Given a plan of action by the incident commander, describe their role in a hazardous materials incident as identified in the local emergency response plan or organization's standard operating procedures.
EMS(1)-5.1 NFPA 2-3.1(a)	Given specific scenarios, describe the emergency medical component for the hazardous materials incident response plan as developed by the authority having jurisdiction.
EMS(1)-5.2 NFPA 2-3.1(b)	State the Level I responder's role within the hazardous materials response plan as developed by the authority having jurisdiction.
EMS(1)-5.3 NFPA 2-3.1(c)	State the Level I responder's role within the hazardous materials incident management system.
EMS(1)-6 NFPA 2-3.2	Given a hazardous materials incident, be able to plan a response to provide the appropriate level of emergency medical care, including the standard operating procedures for the medical management of persons exposed to hazardous materials, as specified by the authority having jurisdiction.
EMS(1)-6.1 NFPA 2-3.3	Given the name of the hazardous material and the type, duration, and extent of exposure and decontamination process, determine if available personal protective clothing and equipment are appropriate to implement the planned response.
EMS(1)-6.2 NFPA 2-3.3(a)	Describe the application, use, and limitations of the following: (a)Street clothing and work uniforms (b)Structural fire fighting protective clothing (c)Respiratory protective equipment (d)Chemical-protective clothing
EMS(1)-6.3 NFPA 2-3.4	Given a simulated hazardous materials incident, determine if available equipment and supplies are appropriate to implement the planned response and describe the equipment and supplies available to the Level I responder for the care and transportation of the hazardous materials incident patient.

Implementing the Planned Response

EMS(1)-7
NFPA 2-4.1
Given a plan for providing patient care at a hazardous materials incident, be able to perform the preparations necessary to receive the patient for treatment and transport.

EMS(1)-7.1
NFPA 2-4.1(a)
List the information that needs to be communicated to the Medical Control/Receiving facility regarding the hazardous materials incident, including the following:
(a)Type and nature of the incident
(b)Chemical involved and its physical state
(c)Number of potential patients

EMS(1)-7.2
NFPA 2-4.1(b)
Describe the procedure for preparing the vehicle and equipment for the patient.

EMS(1)-7.3
NFPA 2-4.1(c)
Demonstrate the proper donning, doffing, usage, and limitations of all personal protective equipment provided to the Level I responder by the authority having jurisdiction for use in their hazardous materials response activities.

EMS(1)-7.4
NFPA 2-4.1(d)
Describe the concept of patient transfer from the incident site to the decontamination area and then to the treatment area.

EMS(1)-8
NFPA 2-4.2
Given a patient from a hazardous materials incident, provide patient care consistent with the planned response and the organization's standard operating procedures.

EMS(1)-8.1
NFPA 2-4.2(a)
Describe how chemical contamination alters the assessment and care of the hazardous materials patient.

EMS(1)-8.2
NFPA 2-4.2(b)
List the common signs and symptoms and describe the EMS treatment protocols for the following:
(a)Corrosives (e.g., acid, alkali)
(b)Pulmonary irritants (e.g., ammonia, chlorine)
(c)Pesticides (e.g., organophosphates, carbamates)
(d)Chemical asphyxiants (e.g., cyanide, carbon monoxide)
(e)Hydrocarbon solvents (e.g., xylene, methylene chloride)

EMS(1)-8.3
NFPA 2-4.2(c)
Explain the potential risk with invasive procedures for hazardous materials patients.

EMS(1)-8.4
NFPA 2-4.2(d)
Demonstrate the ability to perform the following EMS functions within the incident management system during incidents involving multiple hazardous materials patients:
(a)EMS control
(b)Triage
(c)Treatment
(d)Disposition and transportation

EMS(1)-9
NFPA 2-4.3
Given a patient from a hazardous materials incident, transport the patient as specified in the local emergency response plan and the organization's standard operating procedures.

EMS(1)-9.1 NFPA 2-4.3(a)	Identify the capabilities of the medical facilities available in the local area to receive hazardous materials patients.
EMS(1)-9.2 NFPA 2-4.3(b)	Identify the acceptable vehicles available to transport hazardous materials patients from the treatment area to a receiving facility.
EMS(1)-9.3 NFPA 2-4.3(c)	List the pertinent information that needs to be communicated to the receiving facility, including the following: (a)Estimated time of arrival (b)Age/sex (c)Patient condition/chief complaint (d)Associated injuries (e)Routes, extent, and duration of chemical exposure (f)Pertinent medical history (g)Signs and symptoms (h)Vital signs (i)Treatment, including decontamination and patient response (j)Pertinent chemical characteristics
EMS(1)-9.4 NFPA 2-4.3(d)	Describe the actions necessary for the coordinated delivery of hazardous materials incidents patients to a receiving facility.
EMS(1)-9.5 NFPA 2-4.3(e)	Explain the special hazards associated with air transportation of patients exposed to hazardous materials
EMS(1)-10	Describe the patient decontamination process.

Terminating the Incident

EMS(1)-11 NFPA 2-5.1	Upon termination of the hazardous materials incident, complete the reporting, documentation, and EMS termination activities as required by the local emergency response plan or the organization's standard operating procedures.
EMS(1)-11.1 NFPA 2-5.1(a)	Given scenarios, list the information to be gathered regarding the exposure of the patient and the EMS provider and describe the proper reporting procedures, including the following: (a)Product information (b)Routes, extent, and duration of exposure (c)Actions taken to limit exposure and contamination (d)Treatment rendered (e)Patient condition and disposition
EMS(1)-11.2 NFPA 2-5.1(b)	Given scenarios, identify situations that can necessitate critical incident stress debriefing intervention.
EMS(1)-11.3 NFPA 2-5.1(c)	Describe the EMS provider's role in the post-incident critique.

Hazardous Materials

Incident Response Training Guidelines

Emergency Medical Service Responder Level 2

General Training Considerations

Introduction

Emergency medical service (EMS) responder Level 2 shall be trained to the competencies of the first responder at the awareness level; as defined in OSHA 1910.120(q)(6)(i), to the competencies of EMS Level 1 as defined in these guidelines and NFPA Standard 473, and to the competencies recommended in this section for EMS Level 2. In addition, EMS responders Level 2 shall meet the training requirements of local occupational health and safety agencies, OSHA, and EPA, as appropriate for their jurisdiction, and emergency medical technician A certification standards.

Decontamination of patients or rescue personnel is a critical task. These individuals have come in contact with a foreign agent that will cause either short- or long-term medical problems. Whether the ramifications of contact with the foreign agent are long-term, chronic or acute, the need to have medically trained personnel, emergency medical technicians, and paramedics conducting decontamination procedures is imperative and self-explanatory. Using certified emergency medical technicians and paramedics trained in hazardous materials to conduct the decontamination operation will result in a higher level of care and the ability to provide effective and efficient patient assessment and prehospital care that will benefit all who are involved with these types of operations.

Level 2 responders are expected to be able to analyze hazardous materials incidents to determine the magnitude of problem areas. They also are expected to plan a response and provide the appropriate level of emergency medical care and decontamination to persons involved in hazardous materials incidents, provide medical support to hazardous materials response personnel, and implement and terminate the response.

Definition

Emergency medical services responder Level 2 are persons who, in the course of their normal activities, may be called on to perform patient care and decontamination activities in the warm zone (the area where personnel and equipment decontamination and hot zone support take place) at hazardous materials incidents. Level 2 responders are called on to provide care to individuals who still pose a significant risk of secondary contamination. In addition, personnel at this level shall be able to coordinate EMS activities at a hazardous materials incident and provide medical support to and decontamination of hazardous materials response personnel.

Audience

EMS responder Level 2 may be public- or private-sector individuals charged with the responsibility of providing and coordinating EMS services at a hazardous materials scene. They include selected emergency medical technicians and paramedics as well as members of industrial fire brigades who are assigned patient care responsibility at a hazardous materials incident on-site or off-site.

Related Health, Safety, and Performance Standards

OSHA 29 CFR 1910.120
EPA 40 CFR 311
NFPA 472
NFPA 473
NFPA 1561 Standard on Fire Department Incident Management System, 1995 Edition
U.S. Fire Administration Emergency Incident Rehabilitation Guide, FA-114

Recognized DOT, State, regional, or local training curricula should constitute the entry-level EMS preparation for continuing hazardous materials training. When a hazardous materials incident occurs, all EMS basic life-support-provider personnel responding should have been trained to the emergency medical technician A level or equivalent.

Appropriate Methodologies

EMS Level 2 training should include a combination of traditional classroom lecture with small-group activities, field exercises involving working with the incident command structure in simulated emergencies, and hands-on psychomotor skill training. Content instruction should focus on contamination hazards, decontamination procedures, health monitoring treatment procedures, and incident scene roles and responsibilities. Trainee activities should focus on assessment and analysis of hazards and determination of appropriate procedures. Skill training should focus on implementing decontamination and patient care procedures and the use of appropriate personal protective equipment. Written and practical examinations are highly recommended to measure achievement in initial training and refresher programs and to support the employer's responsibility that all EMS Level 2 personnel be trained to competency before being called on to perform Level 2 functions at emergencies. Table-top and field exercises should focus on acting out incident scene roles and on implementing procedures in a field environment. Refresher training should be conducted on a yearly basis and should focus on technical updates, updates on changes in response protocols and SOP's, and renewal of individual skills in decontamination, patient treatment, and use of personal protective equipment.

SUMMARY: Emergency Medical Services Responder Level 2

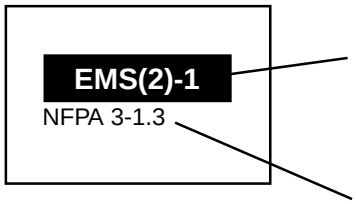
Audience	Prerequisites	Training	Refresher
Moderate size training audience. Paramedics and emergency medical technicians who may be called upon to conduct decontamination and patient care in the warm and hot zone of a hazardous materials incident scene.	1. First Responder Awareness training. 2. EMS Level 1 training.	- Classroom, physical skills lab, and simulator/field instruction, with emphasis on decision making and treatment skills. - Competencies: - Assessing incident scene hazards and risks of patient secondary contamination. - Incident scene response planning, including determining personal protective equipment needs and defining roles and responsibilities of the EMS Level 2 responder. - Ability to perform EMS Level 2 patient decontamination and treatment in the warm zone of an incident scene. - Ability to perform post-incident EMS reporting, documentation, and follow-up.	1. Technical updates. 2. Changes in response protocols and incident command system SOP's. 3. Renewal and retesting of incident scene decision making and warm zone decontamination and treatment skills.

Recommended Training

For EMS Responder Level 2 Training

The following training objectives are recommended for emergency medical service responder Level 2. The primary source for this material is NFPA 473: Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents, Chapter 3: Competencies for EMS/HM Level 2 Responders.

In general, these recommended objectives compare in scope and concept to the general requirements of OSHA that all responding personnel be properly trained to perform their assigned roles in a hazardous materials emergency.



Objective Identification Legend

This is the identification used in this document. It matches the identification code used in course assessment references. Decimal numbers (such as EMS(2)-1.1) indicate enabling objectives supporting the primary objective.

This indicates the origin of this objective. Usually it is directly from NFPA 473, Chapter 3.

Identification	***Recommended** Training Objectives*
EMS(2)-1 NFPA 3-1.3	Given a hazardous materials incident scenario, demonstrate an understanding of the role of the emergency medical service responder Level 2.
EMS(2)-1.1 NFPA 3-1.3(a)	Describe the responsibility of the emergency medical service responder Level 2 to analyze a hazardous materials incident to determine the magnitude of the problem in terms of outcomes.
EMS(2)-1.2 NFPA 3-1.3(b)	Describe the responsibility of the emergency medical service responder Level 2 to plan a response to provide the appropriate level of emergency medical care to persons involved in hazardous materials incidents and to provide medical support to hazardous materials response personnel.
EMS(2)-1.3 NFPA 3-1.3(c)	Describe the responsibility of the emergency medical service responder Level 2 to implement the planned response.
EMS(2)-1.4 NFPA 3-1.3(d)	Identify the responsibility of the emergency medical service responder Level 2 to terminate the incident.
	Analyzing the Hazardous Materials Incident
EMS(2)-2 NFPA 3-2.1	Given an emergency involving hazardous materials, determine the hazards to the responders and the patient in that situation.

EMS(2)-2.1
NFPA 3-2.1(a)

Define the following chemical and physical properties and describe their importance in the risk assessment process:

(a)Boiling point
(b)Flammable (explosive) limits
(c)Flash point
(d)Ignition temperature
(e)Specific gravity
(f)Vapor density
(g)Vapor pressure
(h)Water solubility

EMS(2)-2.2
NFPA 3-2.1(b)

Define alpha radiation, beta radiation, and gamma radiation.

EMS(2)-2.3
NFPA 3-2.1(c)

Define the following toxicological terms and explain their use in the risk assessment process:

(a)Threshold limit value (TLV-TWA)
(b)Lethal concentration and doses ($LD_{50/100}$)
(c)Parts per million/billion (ppm/ppb)
(d)Immediately dangerous to life and health (IDLH)
(e)Permissible exposure limit (PEL)
(f)Short-term exposure limit (TLV-STEL)
(g)Ceiling level (TLV-C)

EMS(2)-2.4
NFPA 3-2.1(d)

Given a specific hazardous material and using the information sources available to the Level II responder, demonstrate extracting appropriate information about the physical characteristics and chemical properties, hazards, and suggested medical response considerations for that material.

EMS(2)-3
NFPA 3-2.2

Given a hazardous materials incident with a patient(s), assess the patient and conditions to determine the risk of secondary contamination.

EMS(2)-3.1
NFPA 3-2.2(a)

Identify sources of technical information for the performance of patient decontamination.

EMS(2)-3.2
NFPA 3-2.2(b)

Identify the factors that influence the decision of when and where to treat the patient and the extent of patient care, including the following:

(a)Hazardous material toxicity
(b)Patient condition
(c)Availability of decontamination

Planning the Response

EMS(2)-4
NFPA 3-3.1

Given a plan of action by the incident commander, and a role in a hazardous materials incident as identified in the local emergency response plan or the organization's standard operating procedures, describe the importance of coordination between various agencies at the scene of hazardous materials incidents.

Recommended Training

EMS(2)-5
NFPA 3-3.2

Given a hazardous materials incident, plan a response to provide the appropriate level of emergency medical care to persons involved in hazardous materials incidents and to provide medical support to hazardous materials response personnel.

EMS(2)-5.1
NFPA 3-3.2(a)

Given a simulated hazardous materials incident, assess the problem and formulate and implement a plan including the following:

(a) EMS control activities
(b) EMS component of an incident management system
(c) Medical monitoring of personnel utilizing chemical-protective and high temperature-protective clothing
(d) Triage of hazardous materials victims
(e) Medical treatment for chemically contaminated individuals
(f) Product and exposure information gathering and documentation

EMS(2)-5.2
NFPA 3-3.2(b)

Describe the importance of pre-emergency planning relating to specific sites.

EMS(2)-5.3
NFPA 3-3.2(c)

Describe the hazards and precautions to be observed when approaching a hazardous materials incident.

EMS(2)-5.4
NFPA 3-3.2(d)

Describe the considerations associated with the placement, location, and setup of the patient decontamination site.

EMS(2)-5.5
NFPA 3-3.2(e)

Explain the advantages and limitations of the following techniques of decontamination and how they are or are not applicable to patient decontamination:

(a) Absorption
(b) Chemical degradation
(c) Dilution
(d) Isolation

EMS(2)-5.6
NFPA 3-3.2(f)

Describe when it would be prudent to pull back from a hazardous materials incident.

EMS(2)-6
NFPA 3-3.3

Given the name of the hazardous material and the type, duration, and extent of exposure, determine if the protective clothing and equipment available to EMS personnel is appropriate to implement the planned response.

EMS(2)-6.1
NFPA 3-3.3(a)

Identify the advantages and dangers of search and rescue missions at hazardous materials incidents.

EMS(2)-6.2
NFPA 3-3.3(b)

Identify the advantages and hazards associated with the rescue, extrication, and removal of a victim from a hazardous materials incident.

EMS(2)-6.3
NFPA 3-3.3(c)

Describe the types, application, use, and limitations of protective clothing used by EMS personnel at hazardous materials incidents.

EMS(2)-6.4
NFPA 3-3.3(d)

Demonstrate how to interpret a chemical compatibility chart for chemical-protective clothing.

Implementing the Planned Response

EMS(2)-7 NFPA 3-4.1	Given a plan for providing patient care at a hazardous materials incident, perform the preparations necessary to receive the patient for treatment and transport and demonstrate the proper donning, doffing, and usage of all personal protective equipment provided to the Level II responder by the authority having jurisdiction.
EMS(2)-8 NFPA 3-4.2	At the scene of a hazardous materials incident, provide or coordinate the patient care.
EMS(2)-8.1 NFPA 3-4.2(a)	Given a simulated hazardous materials incident and using local available resources, demonstrate the implementation of the patient decontamination procedure.
EMS(2)-8.2 NFPA 3-4.2(b)	Explain the principles of emergency decontamination and its application for critically ill patients.
EMS(2)-8.3 NFPA 3-4.2(c)	Demonstrate the ability to coordinate patient care activities, including treatment, disposition, and transportation of patients.
EMS(2)-9 NFPA 3-4.3	Given a simulated hazardous materials incident, demonstrate the ability to establish and manage the EMS component of an incident management system.
EMS(2)-10 NFPA 3-4.4	Given a simulated hazardous materials incident, perform medical support of hazardous materials incident response personnel.
EMS(2)-10.1 NFPA 3-4.4(a)	Explain the components of pre-entry and post-entry assessment, including the following: (a)Vital signs (b)Body weight (c)General health (d)Neurological status (e)Electrocardiographic rhythm strip, if available
EMS(2)-10.2 NFPA 3-4.4(b)	Explain the following factors and how they influence heat stress for hazardous materials response personnel: (a)Hydration (b)Physical fitness (c)Environmental factors (d)Activity levels (e)Level of PPE (f)Duration of entry
EMS(2)-10.3 NFPA 3-4.4(c)	Explain the medical monitoring protocols and demonstrate medical monitoring procedures for personnel at the scene of a hazardous materials incident.

EMS(2)-10.4 NFPA 3-4.4(d)	Describe the criteria for site selection of a medical monitoring station.
EMS(2)-10.5 NFPA 3-4.4(e)	Demonstrate the ability to set up and operate a medical monitoring station.
EMS(2)-10.6 NFPA 3-4.4(f)	Demonstrate the ability to interpret and analyze data obtained from medical monitoring of hazardous materials response personnel.
EMS(2)-10.7 NFPA 3-4.4(g)	Given a simulated hazardous materials incident, demonstrate proper documentation of medical monitoring.

Terminating the Incident

EMS(2)-11 NFPA 3-5.1	Upon termination of the hazardous materials incident, complete the reporting, documentation, and EMS termination activities as required by the local emergency response plan or the organization's standard operating procedures.
EMS(2)-11.1 NFPA 3-5.1(a)	Describe the information regarding incident EMS activities that needs to be relayed through the chain of command to the incident commander.
EMS(2)-11.2 NFPA 3-5.1(b)	Describe the activities required in terminating the EMS component of a hazardous materials incident.
EMS(2)-11.3 NFPA 3-5.1(c)	Describe the process and demonstrate the ability to conduct the EMS portion of an incident critique
EMS(2)-11.4 NFPA 3-5.1(d)	Explain the process of making revisions to EMS operating procedures and response capabilities as a result of information learned
EMS(2)-12	Describe the necessary procedures required to decontaminate all equipment to render it back in service and the proper disposal of equipment that requires the same.

Hazardous Materials

Incident Response Training Guidelines

Hospital Personnel

General Training Considerations

Introduction

Hospital Emergency Department Personnel face a difficult task when dealing with contaminated patients. Contaminated patients may arrive at the hospital by their own means or be transported by Emergency Medical Services providers when field decontamination is impractical. It is essential that all emergency departments have the capability to recognize, assess, and begin the treatment of hazardous material patients, including those who are contaminated with a hazardous substance. Furthermore, the hospital emergency department must assure the protection of their own medical staff and the continued well being of hospital residents. The hospital is an integral emergency responder when dealing with a chemical emergency or disaster and training programs must address the unique and valuable role played by the communities acute residential care system.

At a minimum, hospital personnel must be able to analyze the situation, assess patient conditions and problems, take the necessary steps to assure medical provider safety, attempt identification of the offending chemical substance, and initiate the decontamination and medical care process.

Definition

Hospital emergency department personnel are persons who, in the course of their normal work activities, may be called upon to perform patient care and decontamination within the confines of the hospital. These personnel in the performance of their duties may be exposed to a significant risk of secondary contamination from the patients for which they are charged to provide care. In addition these personnel may be called upon to assist pre-hospital personnel requiring technical assistance in the area of patient decontamination.

Audience

Hospital emergency department personnel may be public or private-sector individuals charged with the responsibility of coordinating and providing medical treatment of patients who have been exposed to or contaminated by hazardous materials. They include selected emergency department staff including physicians, nurses at all levels, aids, support staff as well as any other individual assigned to care for patients received from a hazardous materials emergency on or off site.

Related Health, Safety, and Performance Standards

OSHA 29 CFR 1910.120
OSHA 29 CFR 1910.134
OSHA 29 CFR 1910.1030
EPA 40 CFR 311
Joint Commission for the Accreditation of Healthcare Organizations (JCAHO)

Recognized DOT, State, regional, or local training curricula should be a basis for hospital personnel preparation and continuing hazardous materials training and education. The Joint Commission for the Accreditation of Healthcare Organizations has requirements which hospitals must meet to receive accreditation.

Hospital accreditation in most states is a necessary requirement for the facility to receive a hospital license and insurance reimbursements. The JCAHO requirements relating to hazardous materials and hospital community planning are reflected in the following training objectives.

Appropriate Methodologies

Hospital Emergency Department personnel training should include a combination of traditional classroom lecture with small-group activities, field exercises involving working in simulated emergencies, and hands-on psychomotor skill training. Content instruction should focus on contamination hazard, decontamination procedures, patient flow within the hospital, health treatment procedures and roles and responsibilities. Trainee activities should focus on assessment and analysis of hazards and determination of appropriate procedures. Skill training should focus on implementing decontamination and patient care procedures, use of reference materials and the use of appropriate personal protective equipment. Written and practical examinations are highly recommended to measure achievement in initial training and refresher programs and to support the employer's responsibility that all emergency department personnel be trained to competency before being called upon to perform at emergencies. Exercises should focus on acting out the assigned roles and on implementing procedures in the hospital environment. Refresher training should be conducted on a yearly basis and should focus on technical updates, updates on changes in hospital protocol and procedures, and renewal of individual skills in decontamination, patient treatment, and use of personnel protective equipment.

SUMMARY:Hospital Personnel

Audience	Prerequisites	Training	Refresher
Moderate in size. Hospital emergency department personnel who may coordinate or provide treatment to patients who have been exposed to or contaminated by hazardous materials.	None, beyond professional competencies associated with role in hospital emergency department.	- Classroom, lab instruction with simulated emergencies, hands-on psychomotor skill training. - Competencies: - Knowledge of contamination hazards, decontamination procedures, patient flow, health treatment procedures, roles and responsibilities. - Ability to implement decontamination, use of reference materials, and use of personal protective equipment.	1. Technical updates. 2. Updates on changes in hospital protocols and procedures. 3. Renewal of skills in decontamination, patient treatment, and use of personal protective equipment.

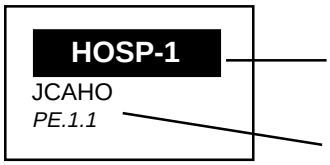
Recommended Training

For Hospital Emergency Department Personnel

The following training objectives are recommended for hospital emergency department personnel. The primary source for this material is the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) standards for handling contaminated patients. The following training material is not only recommended for emergency department physicians and nursing staff but for all hospital personnel who may have a role in the hospital response.

In general, these recommended objectives compare in scope and concept to the general requirements of OSHA that all personnel which may be required to respond to hazardous material releases be properly trained to perform their assigned roles in times of emergencies.

Objective Identification Legend



This is the identification objective used in this document. It matches the identification code used in course assessment references.

This indicates which components of the JCAHO standards are addressed by this objective.

Identification	***Recommended** Training Objectives*
HOSP-1	Describe the ways in which a medical center or hospital can become involved in a hazardous material event or response effort.
	Decontamination of Patients
HOSP-2	Describe some of the key issues involved in the reception of a patient contaminated by or exposed to a chemical substance.
HOSP-2.1 JCAHO *PE.1.1*	Presented with a contaminated patient(s), determine the initial screening or assessment of the patient(s) physical, psychological, and social status to determine the need for care, the type of care to be provided, and the need for any further assessment.
HOSP-2.2 JCAHO *PE.1.2, PE.1.2.1, PE.1.2.2*	Determine the scope and intensity of any further patient assessment which is determined by: (a)The patient's diagnosis; (b)The care setting
HOSP-2.3 JCAHO *PE.1.4*	Given a contaminated patient(s), identify the diagnostic testing, including laboratory and other invasive and noninvasive diagnostic and imaging procedures, relevant to the determination of the patient(s) health care or treatment needs and to the actual care or treatment of the patient(s) to be performed.

HOSP-2.4	JCAHO *IM.9, IM.9.1, IM.9.2, IM.10.1*	List and describe the hospital's hazardous materials information resources and assure that they are authoritative and up to date.
HOSP-2.5		Define the following toxicological terms as they relate to the treatment of a contaminated patient in the hospital setting: (a)Threshold Limit Value - TLV (b)Threshold Limit Value - Time Weighted Average -TLV-TWA (c)Threshold Limit Value - Short-term Exposure Limit - TLV-STEL (d)Threshold Limit Value - Ceiling - TLV-C (e)Immediately Dangerous to Life and Health - IDLH (f)Lethal Dose 50 - LD50 (g)Lethal Concentration 50 - LC50
HOSP-2.6		Define the effect chemicals may have on a contaminated patient using the method of Dose-Response Relationship.
HOSP-2.7		Describe the routes by which chemicals may enter the body.
HOSP-2.8		List the target organ systems which may be effected in the contaminated patient.
HOSP-2.9		List the areas of the body that are most likely to have greater route of chemical absorption into the body.
HOSP-2.10	JCAHO *PE.1.1, PE.2.1, PE.2.2, PE.2.3, PE.2.4*	Demonstrate that each patient is reassessed at regularly specified times related to the patient's course of treatment to determine the patient's response to treatment; (a)When a significant change occurs in the patient's condition; and (b)When a significant change occurs in the patient's diagnosis.
HOSP-2.11	JCAHO *PE.3.1, PE.4.2*	Demonstrate that patient care decisions are based on the identified patient needs and on care priorities.
HOSP-2.12	JCAHO *PE.4.3*	Describe the need for nursing personnel to assess the patient's need for nursing care in all settings where nursing care is to be provided.
HOSP-2.13	JCAHO *IM.9.2, IM.10.1*	Describe the methods used to assure the pharmacy, medical, and nursing staff have access to poison control information.
HOSP-2.14		List at least four resources available to hospital providers to assist with the treatment of a contaminated patient.
HOSP-2.15		List the equipment needed in the emergency department to provide for effective decontamination of a patient.

HOSP-2.16 List and describe the proper usage of Personnel Protective Equipment (PPE) used by emergency department staff during patient decontamination procedures.

HOSP-2.17 Demonstrate the ability to determine the need for, and if required, the use of special respiratory protection for the emergency department staff and the patient during decontamination procedures.

Planning For The Response

HOSP-3 Describe the need for the hospital to develop emergency response plans.
JCAHO
LD.1.1, EC.1.6

HOSP-3.1 Identify the necessity for the hospital administrators to communicate the hospitals plan(s) throughout the organization.
JCAHO
LD.1.2

HOSP-3.2 Identify the areas in the hospital plan(s) that include patient care services in response to identified patient needs and is consistent with the organization's mission and ability to provide service.
JCAHO
LD.1.3

HOSP-3.3 Identify the hospital personnel, and, as appropriate, community leaders and organizations which need to collaborate to design services to be provided by the hospital.
JCAHO
LD.1.3.1

HOSP-3.4 Identify the need to design into the plan patient care services to be provided throughout the hospital organization that are appropriate to the scope and level of care required by the patients that may be served.
JCAHO
LD.1.3.2

HOSP-3.5 Describe the setting in the planning process for performance-improvement priorities and identify how the hospital adjusts priorities in response to unusual or urgent events.
JCAHO
LD.1.4

HOSP-3.6 Identify the need for the scope of service provided by each department as defined in writing and is approved by the hospitals administration, medical staff, or both, as appropriate.
JCAHO
LD.1.7

Implementing The Planned Response

HOSP-4 Describe the hospitals documented management plan(s) for the environment of care to be provided during a hazardous materials emergency that considers all factors of the emergency response.
JCAHO
EC.1.2

HOSP-4.1 Describe the safety factors outlined in the plan as listed below:

(a) Ensuring that emergency service areas are clearly identified;
(b) Establishing a risk-assessment program that proactively evaluates the impact on patient and public safety of the buildings, grounds, equipment, occupants, and internal physical systems;
(c) Requiring an annual evaluation of the objectives, scope, performance, and effectiveness of the documented safety management plan.

HOSP-4.2	JCAHO *EC.1.4*	Describe the security factors outlined in the plan listed below: (a)Providing access control, as appropriate, to sensitive areas; (b)Provide vehicular access to emergency service areas; (c)Providing traffic control for emergency service areas.
HOSP-4.3	JCAHO *EC.1.6*	Describe the factors outlined in the plan related to Hazardous Wastes within the hospital listed below: (a)Monitor and disposing of hazardous wastes (b)Reporting and investigating all hazardous materials or waste spills and exposures or other incidents that involve patients, visitors, personnel, or property.
HOSP-4.4	JCAHO *EC.1.6*	List and describe the factors outlined in the hospital's emergency preparedness program.
HOSP-4.4.1	JCAHO *EC.1.6*	Describe the procedure for establishing, supporting and maintaining an emergency preparedness program.
HOSP-4.4.2	JCAHO *EC.1.6.a*	Describe the steps for implementing specific procedures in response to a variety of disasters and/or emergencies, internal and external of the hospital.
HOSP-4.4.3	JCAHO *EC.1.6.b*	Describe the ways of defining and, when appropriate, integrating the hospital's role with community-wide emergency preparedness efforts.
HOSP-4.4.4	JCAHO *EC.1.6.c*	Describe the procedure for notifying the proper authorities outside the hospital in an emergency.
HOSP-4.4.5	JCAHO *EC.1.6.d*	Describe the procedure for notifying hospital personnel of an implementation of the emergency preparedness plan.
HOSP-4.4.6	JCAHO *EC.1.6.m*	Describe the ways of defining, where appropriate, alternate roles and responsibilities of hospital personnel during disasters and/or emergencies.
HOSP-4.4.7	JCAHO *EC.1.6.e*	Describe the procedure for assigning available personnel to reflect current staffing patterns within the hospital during times of disaster and/or emergency.
HOSP-4.4.8	JCAHO *EC.1.6.f*	Describe the procedures for the management of space, supplies and security during disasters and/or emergencies.
HOSP-4.5	JCAHO *EC.1.6.g*	Describe the procedures for evacuating the entire facility if the organization's environment cannot continue to support adequate patient care and treatment.

Recommended Training

HOSP-4.5.1	JCAHO *EC.1.6.h*	Describe the procedures for establishing an alternate care site if the hospital environment cannot continue to support adequate patient care and treatment.
HOSP-4.5.2	JCAHO *EC.1.6.l*	Describe the ability to identify, where appropriate, available facilities for radioactive or chemical isolation and decontamination if additional resources are needed.
HOSP-4.5.3	JCAHO *EC.1.6.i*	Describe the procedures for managing patients during disasters or emergencies, including the scheduling, modification, or discontinuation of services, control of patient information, and admission, transfer and discharge of patients.
HOSP-4.5.4	JCAHO *EC.1.6.n*	Describe the requirements for an annual evaluation of the objectives, scope, performance, and effectiveness of the hospital's documented emergency preparedness management plan.
HOSP-4.6		List the specialized medical equipment needed for treating patients and/or responding to hazardous materials emergencies including selecting and acquiring the medical equipment.

Hazardous Materials

Incident Response Training Guidelines

Special Topics

The section on Radiological Response Training Issues is being re-written by representatives of the National Response Team, the previous 1998 version incorrectly described insufficient levels of training for EMS Responders to radiological incidents.
The corrected section will be posted at this location when completed, and will be included in the *2000 Edition of the Guidelines*.

Issues in Hazardous Materials Incident Recovery/Cleanup

The addition of objectives that address tactical considerations for minimizing the recovery/cleanup process has merit for several reasons.

Improved Handling of the Incident

The fundamental priorities for all emergency responders who respond to hazardous materials incidents are first, protecting life, second, protecting the environment, and last, protecting property and equipment.

Because protection of the environment is second only to the protection of life, the tactical considerations used to handle a hazardous materials emergency must be selected based on the overall effect those tactics will have on the environment.

In formulating tactical considerations aimed at minimizing impact to the environment, in many situations the emergency responders are simultaneously improving the recovery potential and minimizing the cleanup that is required. For example, an incident commander or hazardous materials group supervisor may choose to erect a portable sump to catch a leaking flammable liquid. This particular tactical action will:

- Prevent the spread of the flammable liquid into the environment, thus increasing the level of protection to the environment and minimizing the amount of environmental cleanup required;
- Reduce the hazards of the incident by allowing pooling of the material, thereby reducing the surface area that can evolve flammable vapors;
- Facilitate an improved recovery of the product by having a vacuum truck recover the spilled flammable liquid directly from the portable sump; and
- Allow for recycling of the recovered product, thus reducing the costs to the spiller.

The tactical decisions of the incident commanders and hazardous material group supervisors can negatively affect both the environment and the recovery and cleanup process. The failure of an incident commander or hazardous materials group supervisor to make the correct decision is usually the result of lack of experience in alternative methods. It is common for incident commanders and hazardous materials group supervisors to use techniques based on their structural fire-fighting or flammable liquid and gas fire-fighting methods. These generally involves using water or foam, each of which provides a medium for increasing the size of the spill, spreading the spill, and increasing the damage on both the environment and the recovery/cleanup process.

Unless terminal objectives are identified, incident commanders and hazardous materials group supervisors will make tactical decisions that negatively affect both the environment and the recovery and cleanup process. Instructional materials used to increase the skills of incident commanders and hazardous materials group supervisors should provide the basis for identifying and using the proper tactical decisions.
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Emerging Legal Trends

Another significant reason for using tactical considerations that minimize the impact on the recovery/cleanup process is the legal trend occurring in cost recovery litigation. Because the costs involved in handling a hazardous materials incident are routinely assessed against the spiller, lawyers defending spillers has developed tactics to provide relief to the spiller. This relief attempts to have some of the recovery and cleanup costs transferred from the spiller to the emergency responders when it can be demonstrated that the tactics used by the emergency responders resulted in increased costs.

For example, an incident commander or hazardous materials group supervisor might choose to allow a leaking hazardous material to enter a storm drain instead of attempting to dike the product to keep the product above ground. As a result, the spiller now must have a cleanup company remove the product from the storm drain at a considerable cost. In the ensuing litigation, the attorney for the spiller demonstrates the difference between the actual costs incurred as a result of the actions taken by the emergency responders and those that would have been incurred had the emergency responders kept the product from entering the storm drain. In scenarios of this type, the courts are ruling, with increasing frequency, that the spiller is only responsible for the costs of the recovery/cleanup resulting from the emergency responders used nationally recognized practices. The difference between the actual cost and the costs assessed against the spiller are then transferred to the emergency response agency.

Although this type of litigation action is occurring primarily in bellwether States like California, it is gaining recognition as a litigation technique that can be used effectively for defending and reducing the recovery and cleanup costs assessed against spillers. In addition, this type of litigation is resulting in the actions taken by emergency responders coming under increasing scrutiny to attempt to find errors and omissions that may be used to obtain relief for spillers.

Emergency responders are no longer exempt and protected from legal action when it can be shown that the negative outcomes resulting from their actions can be defined as contributory negligence.

Increasing Enforcement of EPA Regulations

Another purpose for identifying response/recovery terminal objectives that will lead to the development of training in this area is the increasing enforcement by EPA of the Resource Conservation and Recovery Act (RCRA). RCRA clearly states that, after an emergency ends and the recovery and cleanup process begins, emergency responders are no longer exempt from compliance with the requirements of RCRA. As a result, after the emergency has ended, emergency responders must comply with RCRA or face a potential of a fine for noncompliance. An example is a situation where the emergency responders elect to sweep up an absorbed hazardous material that should be disposed of in a proper waste disposal site. Instead, the emergency responders choose to take the absorbent containing the regulated hazardous material and dispose of it in a common landfill dumpster.

The recovery/cleanup objectives have been defined to:

- Identify tactical considerations that minimize the effect of hazardous materials spills on the environment;
- Identify tactical considerations that minimize the financial impact on the recovery and cleanup process;
- Provide training that will protect emergency responders from litigation resulting from using improper tactics, based on past practices, in situations in which using more proactive techniques would have greatly reduced the cost of the recovery and cleanup; and
- Provide training that will protect emergency responders from litigation resulting from their engaging in practices that are not in compliance with RCRA.

How Recovery and Cleanup Tactical Considerations Are Driven by the Risk/Benefit Analysis Process

In addressing the tactical considerations that affect recovery and cleanup, the initial size-up and risk/benefit analysis of the tactical considerations identified early in an incident can have a major impact on the recovery/cleanup process later in the incident.

A quality risk/benefit analysis begins by assessing what the outcomes would be if the emergency responders did absolutely nothing and allowed the incident to go through natural stabilization. The emergency responders must ask themselves at this time, "If I do nothing, what are the outcomes?" In time, the incident will stabilize, and the outcomes will possibly include the loss of life, negative impact on the environment, and damage or loss of property and equipment.

After the emergency responders have identified the outcomes of natural stabilization, the next question they should ask themselves is, "Can I change the outcomes of natural stabilization?" If the answer to this question is "No," the emergency responders should only isolate the hazard area, deny entry, and protect people, the environment, and adjacent property and equipment from exposure.

If the answer is "Yes," then the next question to ask is, "What is the cost of my intervention?" At this time the emergency responders must clearly identify the cost of their intervention in terms of potential loss of life and negative effect on the environment and weigh that cost against the possible benefits of intervention.

If the risk/benefit analysis is conducted correctly, the tactical considerations used in tactical application should have a minimal effect on the recovery and cleanup process. If the risk/benefit analysis is either not conducted or is not conducted properly, the outcomes will have a major negative impact on life, the environment, property and equipment, and the recovery and cleanup process.

Trainees shall identify the negative effect on the recovery and cleanup process resulting from the following:

- Failure to catch a leaking hazardous material to prevent it from spreading into the environment.
- Failure to dike a leaking hazardous material to prevent it from spreading into the environment.
- Failure to dam a hazardous material that has entered a waterway to prevent it from spreading downstream into the environment.
- Failure to a redirect a leaking hazardous material away from a waterway to prevent it from entering the waterway and spreading downstream and affecting the environment.
- Failure to a redirect a leaking hazardous material away from an environmentally sensitive area to prevent it from entering the environmentally sensitive area and negatively impacting the environmentally sensitive area, e.g., a wetland.
- Failure to use absorbent materials to control a leaking hazardous material to prevent it from spreading into the environment.
- Engaging in foam application operations that result in spreading the spill when the product should have been allowed to continue to burn or fuel should have been added to the fire to increase the fire's temperature, e.g., pesticide fires.
- Engaging in fire extinguishing operations that allow water to become a vehicle that spreads the spill before having confinement operations in place.
- Engaging in fire extinguishing operations that allow water to become a vehicle that spreads the spill when the product should have been allowed to continue to burn, such as a burning material that cannot be extinguished by water.
- Engaging in dilution operations, in an attempt to neutralize a corrosive, and allowing the water to become a vehicle that spreads the corrosive before having confinement operations in place.

- Engaging in dilution operations, in an attempt to neutralize a corrosive, and allowing the water to become a vehicle that spreads the spill without recognizing that the volume of water needed to truly dilute the spill cannot be managed by the emergency responders (e.g., to dilute one gallon of a corrosive with pH of 1 to a pH of 6 requires 111,110 gallons of water).
- Failure to protect the environment, by using salvage covers or visqueen to cover exposed soil, when redirecting a spilled material into a ditch or other area being used as a catch basin or holding pond.
- Failure to segregate spilled oxidizers from spilled fuels, such as diesel fuel, to prevent a chemical reaction that results in an ignition and subsequent negative impact on the environment from the intensity of the fire or the spattering that may occur.
- Failure to segregate spilled materials that have oxidizing characteristics from spilled fuels, such as diesel fuel, to prevent a chemical reaction that results in an ignition and subsequent negative impact on the environment from the intensity of the fire.

The National Contingency Plan
for Federal Response to Oil Spills and Other Hazardous Materials Emergencies

Introduction

Response training for the local responder should include roles and responsibilities at emergencies involving oils spills and others releases of hazardous materials at which the Federal Government responds under the National Contingency Plan (NCP).

The role and responsibilities of the local responder at such incidents may differ from their normal response authorities and performance requirements because the nature of the incident may initiate a federal response in which federal authorities assume command and primary responsibility for the emergency. Such a federal response is prescribed in the NCP. To properly support effective response to these emergencies, it is essential that training for local responders include an understanding of the kinds of incidents that may involve federal response, the roles, responsibilities and authorities of the federal response organizations, the procedures for efficient transfer of command from the local responder to the federal authorities, and the role of the local response organization in the subsequent federal response.

Large oil and hazardous materials spills often involve overlapping jurisdictional responsibilities of the local response organizations and the federal response authorities under the NCP. Inland waterway emergencies such as barge/bridge accidents often involve local emergency personnel as the first responder. It is critical that all local emergency response personnel who may perform at the first responder awareness/operational levels at such incidents be trained in proper incident identification and notification procedures related to the NCP to ensure that all appropriate federal authorities are notified and mobilized in a timely fashion.

In emergencies involving immediate life safety or impending escalation of the release during the initial response, the local incident commander will typically establish a full response command structure and will undertake full defensive and offensive operations as appropriate under local authority. In the event that federal authorities then assume command of such incidents, it is critical that local responders be prepared to efficiently and properly effect transfer of command to best ensure the safety of responders currently on scene and continuation of operations to best protect the public interest, safety and health.

Additionally, complex incidents (such as a train derailment involving multiple hazardous substances at a bridge waterway crossing) will often involve local responders after command is transferred to federal authorities, either as subordinate units at the operational, technician or specialist levels or as joint incident commander in a unified command environment. In these events, it is critical that local responders be trained to understand the command structure that will be employed at the incident and the roles, responsibilities and authorities of the different agencies and organizations that will be involved.

The National Contingency Plan

The Federal Water Pollution Control Act (commonly referred to at the Clean Water Act) and the Oil Pollution Act of 1990 (OPA) provide authority for federal response to and command at incidents involving discharges of oil into or upon the navigable waters of the United States and adjoining shorelines, the waters of the contiguous zone, or waters of the exclusive economic zone, or which may affect the natural resources belonging to, pertaining to, or under the exclusive management authority of the United States. The National Contingency Plan (NCP), and especially the oil spill response appendix to the NCP, define the roles, responsibilities and scopes of authority of all federal, state and local organizations and responders involved in planning for and responding to these incidents. A complete copy of the Appendix to the National Contingency Plan: Oil Spill Response, is included in these guidelines in section 5: Hazardous Materials Standards and Laws.

The On-Scene Coordinator/Remedial Project Manager

The On-Scene Coordinator/Remedial Project Manager (OSC/RPM) is the federal official predesignated by EPA or the USCG to coordinate and direct federal responses to oil spill emergencies. The OSC/RPM monitors or directs all federal, state, local and private removal actions, or arranges for the removal of an actual or threatened oil discharge, removing and if necessary, requesting authority to destroy a vessel. Additionally, the Clean Water Act requires the OSC/RPM to direct all federal, state, local and private removal actions to any incident that poses a substantial threat to the public health or welfare.

The National Response System

The national response system (NRS) is the mechanism for coordinating response actions by all levels of government to oil spill and other hazardous materials emergencies where the response is directed under the authority of the On Scene Coordinator (OSC). The NRS is composed of the National Response Team (NRT), Regional Response Teams (RRTs), the On-scene Coordinator, Area Committees, and Special Teams and related support entities such as private firms and state and local governments.

Notification Responsibilities

Notification of an oil discharge, or of a release of a hazardous substance in an amount equal to or greater than the Reportable Quantity (RQ), must be made immediately to the NRC in accordance, respectively, with 33 CFR part 153, subpart b, and 40 CFR part 302.

The NRC acts as the single point-of-contact for all pollution-incident reporting and as the NRT communications center. The NRC receives and immediately relays telephone notices of discharges or releases to the appropriate predesignated Federal OSC and/or RPM, and advised the Federal Emergency Management Agency of a potential major disaster or evacuation situation.

Transfer of Command

Clear and complete transfer of command from the local incident commander to the OSC/RPM is very important. There are many financial and legal liabilities associated with spill response and clean-up that the OSC/RPM is both legally authorized and expertly trained to address, and it is in the best interests of the local response organization to pass these responsibilities to the OSC/RPM as soon and as completely as possible.

It is also important to note that the decision to transfer command from local or state authorities to federal authorities is usually and preferably a joint decision, but final authority rests with the OSC/RPM or designee, not by the local incident commander. The local incident commander can NOT legally refuse to transfer command or to release control of the local response units on scene at the time of transfer. Transfer of command should be formal, immediate, and either witnessed or in writing with time of transfer noted.

When the OSC/RPM notifies the local incident commander that the OSC is assuming control, the local incident commander should be prepared to provide an immediate situation report, including the following:

- Life safety hazards, if any
- Property and/or exposure hazards, if any
- Status of breaches and product release
- Defensive operations taken or in progress
- Offensive operations taken or in progress
- Call codes, location, assignments, number, qualifications, and time at incident of all resources at the scene.
- Staging status report
- Additional resources on call or en route.
- Organizations notified and representatives on site or en route.
- Additional unusual considerations that may impact strategic or tactical decision-making.

Command Structure

As defined in the NCP, the OSC/RPM will use the unified command system to coordinate resources at the incident. Organizations participating with the OSC/RPM in the unified command will vary, depending upon the incident and differences in area plans. The resources deployed at the incident will be organized under an Incident Command System that employs the traditional four strategic command categories: operations, logistics, planning, finance. Unity of command and the use of subordinate division and group structures are the same as for a typical emergency response, although the specific division and group responsibilities will be unique to the spill response and clean-up mission of the organization. Special teams, such as technical clean up teams, are often employed as self-contained organizational units in the response structure. Local responders familiar with response using the Incident Command System should have no difficulty in functioning as subordinate units in the command structure used by the OCS/RPM after assuming command.

Interface between the Local Incident Command System and the Federal Response under the NCP

The first federal official affiliated with an NRT member agency to arrive at the scene of a discharge or release will coordinate activities under the NCP. The federal official is authorized to initiate, in consultation with the predesignated OSC, any necessary action normally carried out by the OSC/RPM until the arrival of the predesignated federal OSC/RPM.

Once the federal EPA OSC has been contacted by the NRC, you can expect the OSC to follow these general guidelines. When the OSC receives a report of a discharge, actions normally should be taken in the following sequence:

Levels of Federal Contingency Plans (FCP)

There are three levels of the Federal Contingency Plans (FCP) that an Incident Commander must be aware of. A federal EPA OSC/RPM, depending on incident status, may act as a resource or may take charge of the incident and activate federal response resources as needed.

1. The NCP is officially called the National Oil and Hazardous Substance Pollution Contingency Plan. It provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The NCP is a guidance document for EPA and other federal agencies with response authority and responsibility under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and certain portions of the Clean Water Act (CWA). This plan is comprehensive in relating how these agencies are involved in a spectrum of pre-event plans for the on-scene response, the study, analysis and remediation, the financing, and the accountability.

2. The Regional Contingency Plans (RCP) are developed by the RRT, working with the States. RCPs were developed for each RCP standard federal region, Alaska, Oceanic in the Pacific, and the Caribbean to coordinate timely, effective response by various federal agencies and other organizations to discharges of oil or releases of hazardous substances, pollutants, or contaminants. RCPs shall, as appropriate, include information on all useful facilities and resources in the region, such as government , commercial, academic, and many other sources. To the greatest extent possible, RCPs shall follow the format of the NCP, the Area Contingency Plans (ACP) and coordinate with SERP and SARA Title III LERPs. RCPPs shall contain lines of demarcation between the inland and coastal zones, as mutually agreed upon by USCP and EPA.

3. The ACP, under the direction of an OSC and subject to approval by the lead agency, each Area Committee, in consultation with the appropriate RRTs, Coast Guard DRGs, NSFCC, SSCs, SERCs, and the LEPCs shall develop an ACP for its designated area. The ACP shall provide for a well-coordinated response that is integrated and compatible with state and local response plans.

Terrorism and Illicit Use of Hazardous Materials: First Responder Training Issues and Ramifications

Introduction

Terrorism is defined as the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, or social objectives. Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of the United States government or population without foreign direction. International terrorism involves terrorist activities committed by groups or individuals who are foreign-based and/or directed by countries or groups outside the United States or whose activities transcend national boundaries.

The illegal storage, transportation and disposal of hazardous materials and wastes pose a great risk to public sector responders. Historically, incidents involving hazardous materials and hazardous wastes have threatened public health and the environment resulting in efforts to enhance control of these materials. Federal, state and local governments have adopted standards and legislation in an attempt to reduce the risks to the public and the environment. The controls adopted have increased the complexities and costs of storage, transportation and disposal of these materials.

Federal Bureau of Investigation (FBI) statistics report a total of 249 terrorist incidents that occurred in the United States between the years 1980 and 1995. The February 20, 1993, bombing of the World Trade Center in New York City and the April 19, 1995, bombing of the Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma, illustrate that terrorism can occur any where within the United States. On March 20, 1995, the nerve agent sarin was released into the Tokyo, Japan subway system by a Japanese cult. This terrorist incident resulted in 12 fatalities and at least 5,510 injuries. One hundred thirty-five of the responders were injured after direct and indirect exposure to the nerve agent. Within the United States, incidents involving biological agents have been documented in major metropolitan areas as well as rural locations. These incidents have occurred on both the east and west coasts as well as central parts of the United States.

The Challenge to Public Sector Responders

Intentional releases of hazardous materials due to acts of terrorism or other criminal activities pose a unique challenge to public sector responders who respond to hazardous materials emergencies. Such intentional releases include, but are not limited to, illegal manufacture of drugs, improper disposal of hazardous materials and wastes, improvised explosive devices, manufacture and release of chemical agents and toxins, culture and dissemination of biological agents, and secondary events targeting public sector responders.

Responders to such incidents who are trained to traditional hazardous materials response competencies may encounter unique exposure risks, emergency control challenges, unusual materials, and complex mass casualty situations that are beyond their experience and current training. For example, public sector responders have been trained traditionally to identify hazardous materials based on outward warning signs and detection clues. However, at incidents involving terrorism or other criminal use of hazardous materials where there is attempted deception about the materials involved, clues such as occupancy location, container shapes, markings, and colors may not be consistent with traditional hazardous materials training. Consequently, rapid identification of the materials and type of problem may be difficult.

Terrorism and Illicit Use of Hazardous Materials

Responders to incidents involving terrorism may encounter unusual chemicals or biological agents or unusual uses of those hazardous materials that have not been addressed thoroughly in current hazardous materials training. For example, nuclear response training for first responders has traditionally been for major catastrophes (i.e., nuclear war and power plant emergencies), and not for small isolated terrorist events. As a second example, the high risk chemical and biological agents that might be involved in terrorist incidents may require unusual protocols and procedures for patient decontamination and treatment that are not addressed in current EMS training. As an additional example, some of the materials that may be involved have unusual dispersal characteristics that responders may not be trained to accommodate when determining of safe perimeters and public protection/evacuation requirements at the incident.

Current training for community emergency planning and preparedness strategies and existing response plans use risk predictions based upon known vulnerabilities and hazard identifications, such as commodity flow studies, fixed facility storage of material, etc. This allows responders to plan for the response prior to an emergency and to assess whether the response capability and resources in the area are sufficient to meet potential emergencies. However, terrorist and other illicit acts involving hazardous materials may occur in untraditional locations that are not normally thought of as high risk hazardous materials locations, such as public gathering places or remote transportation areas. As a result, current protocols for allocating response resources and preparing for hazardous materials emergencies may not allow sufficient response capability for terrorist-related hazardous materials emergencies.

Finally, hazardous materials emergencies involving terrorism or other illicit use of hazardous materials may involve additional and unusual risks to responders beyond those presented by the hazardous materials themselves. Public sector responders may be at additional risk due to secondary releases targeted at responders, primary releases that intentionally create extremely high risk rescue situations, and even to primary releases targeted at public response facilities.

The Challenge to Public Sector Response and Planning Organizations

Public sector response and planning organizations should examine all facets of their response system to ensure preparedness for response to incidents of terrorism and illicit use of hazardous materials. This review should include existing plans, operating procedures, equipment, training and exercises.

Plans should include:

- Consistency and interface with plans from all levels of government, specifically the Federal Response Plan (FRP) and the FRP Terrorism Annex;
- Presidential Decision Directive 39, specifically examining responsibility for crisis management and consequence management in their community;
- Unified command operations with all levels of government; and
- Thorough, in-depth plans for response to mass casualty chemical incidents.

Operating procedures should include:

- Command post operations including command post security, responder accountability, and on-site responder identification;
- Protection against secondary explosive devices and other secondary events;
- Responsibility for and support to crime scene operations, evidence collection and chain of custody; and
- Emergency decontamination at mass casualty chemical incidents.

Equipment should be evaluated to ensure appropriate protection and detection of nuclear, chemical and biological agents (NBC). Existing training, including annual refresher training, for all responders should be enhanced to include competencies for response to incidents involving terrorism or other illicit use of hazardous materials. Finally, agencies should identify a person or persons within their organization as their point of contact for issues regarding terrorism and the illicit use of hazardous materials. These persons should interface with appropriate response agencies to include EMS, fire, haz mat, and law enforcement.

Training Strategies

Training for public sector employees who respond to hazardous materials emergencies at the Awareness, Operations, Technician, EMS, and Incident Commander levels should include thorough instruction to prepare those responders to safely and efficiently respond to hazardous materials emergencies involving terrorism or other illicit use of hazardous materials.

For some metropolitan areas, the Department of Defense, the Department of Justice, and the United States Public Health Service are developing programs to provide in depth training and logistical support to assist public sector response organizations in preparing local responders to better prepare for terrorist-related hazardous materials emergencies. However, for most state, tribal, territory and local training systems outside these high risk metropolitan areas, training for response to such incidents should be addressed as additional competencies within current hazardous materials responder curriculums and training delivery systems.

This additional hazardous materials response training can be accomplished either through additional courses or through enhancement of current hazardous materials courses. Those training systems who have sufficient resources to do so and who would like to add additional courses to their curriculums should be advised that several courses will soon be available in this training area. Training programs are currently under development by several federal training providers, such as the National Fire Academy, and several state training organizations, such as the Virginia Department of Emergency Services, that address these competencies. Information regarding these and other programs and their availability for use will be provided as soon as available to HMEP grantees under separate cover through the HMEP response course assessment and catalog mechanism.

For many training providers, insufficient resources and limited access to responder training time may render impractical the use of additional, supplemental responder training courses addressing terrorism competencies. In that case, training providers may wish to consider addressing the needed training through modification to and enhancement of existing courses within their curriculums. As training providers develop updated modules and training resource materials for use in updating existing courses, information on these materials will be provided to HMEP grantees when available.

Responder Competencies

The National Fire Protection Association has issued a proposed tentative interim amendment to NFPA 472 that articulates additional responder competencies at the Awareness, Operations, Technician and Incident Commander levels for response to hazardous materials emergencies involving terrorism or other illicit use of hazardous materials. These competencies have been included in the recommended portions of the response training guidelines, *Guidelines for Public Sector Hazardous Materials Training*, and are also displayed below.

The domestic terrorism sub-committee for NFPA Standard 473, EMS Responder Levels 1 and 2, is also preparing supplemental competencies for EMS Level 1 and Level 2 responders to terrorist hazardous materials incidents. These competencies have been drafted and will be undergoing extensive national review and comment prior to their implementation. These draft competencies are displayed below for reference but will not be added to the recommended portions of the response training guidelines, Guidelines for Public Sector Hazardous Materials Training, until the competencies have been finalized by NFPA.

Note that the following are intended to supplement existing competencies for response as presented in NFPA 472 and 473, 1997 edition, and should be reviewed in context with the full set of competencies for each response level in order to properly depict the complete responder competency requirements for response to hazardous materials incidents involving terrorism or other illicit use of hazardous materials.

First Responder at the Awareness Level

Analyzing the Incident: *Detecting the Presence of Hazardous Materials.*

(new) 2-2.1.13

Identify types of locations that may become targets for criminal or terrorist activity using hazardous materials.

**The following are some examples of locations:*

(a) Public assembly
(b) Public buildings
(c) Mass transit systems
(d) Places with high economic impact
(e) Telecommunications facilities
(f) Places with historical or symbolic significance

(new) 2-2.1.14

Identify at least four indicators of possible criminal or terrorist activity involving hazardous materials.

**The following are some examples of indicators:*

(a) Hazardous materials or lab equipment that is not relevant to the occupancy
(b) Intentional release of hazardous materials
(c) Unexplained patterns of sudden onset illnesses or deaths
(d) Unusual odors or tastes
(e) Unexplained signs of skin, eye, or airway irritation
(f) Unusual security, locks, bars on windows, covered windows, and barbed wire
(g) Unexplained vapor clouds, mists, and plumes
(h) Patients twitching, tightness in chest, sweating, pin-point pupils (miosos), runny nose (rhinorrhea), and nasal vomiting.

Analyzing the Incident: *Initiating Protective Actions*

(new) 2-4.1.6

Identify the specific actions necessary when an incident is suspected to involve criminal or terrorist activity.

**The following are some examples of action:*

(a) Communicate the suspicion during the notification process
(b) Isolate potentially exposed people
(c) Document the initial observation
(Recommended by authors but not included with NFPA T.I.A.)
(d) Attempt to preserve evidence while performing operational duties

Analyzing the Incident: ***Initiating the Notification Process***

(add to) 2-4.2

Given either a facility or transportation scenario of hazardous materials, with or without criminal or terrorist activities, the first responder at the awareness level shall identify the appropriate initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures.

First Responder at the Operations Level

Analyzing the Incident: ***Surveying the Hazardous Materials Incident***
(new) 3-2.1.6

Identify at least three additional hazards that could be associated with an incident involving criminal or terrorist activity.

**The following are some examples of hazards:*

(a) Secondary events intended to incapacitate emergency responders
(b) Armed resistance
(c) Use of weapons
(d) Booby traps
(e) Secondary contamination form handling patients
(Recommended by authors but not included with NFPA T.I.A.)
(f) Hostage barricade situations

Analyzing the Incident: ***Collecting Hazard and Response Information***
(new) 3-2.2.6

Identify the type of assistance provided by the federal defense authorities, such as the Defense Logistics agency and the U.S. Army Operations Center, with respect to criminal or terrorist activities involving hazardous materials.

(new) 3-2.2.6.1

Identify the procedure for contacting federal authorities as specified in the local emergency response plan (ERP) or the organization's standard operating procedure (SOP).

Analyzing the Incident: ***Predicting the Behavior of a Material and its Container***
(new) 3-2.3.9

Given the following types of warfare agents, identify the corresponding DOT hazard class and division:

(a) Nerve agents
(b) Vesicants (blister agents)
(c) Blood agents
(d) Choking agents
(e) Irritants (riot control agents)
(f) Biological agents and toxins

**Some examples are as follows:*

	DOT Hazard Class
(a) Nerve agents	
Tuban (GA)	*6.1*
Sarin (GB)	*6.1*
Soman (GD)	*6.1*
V agent (VX)	*6.1*
(b) Vesicants (blister agents)	
Mustard (H)	*6.1*
Distilled mustard (HD)	*6.1*
Nitrogen mustard (HN)	*6.1*
Lewsite (L)	*6.1*
(c) Blood agents	
Hydrogen cyanide (AC)	*6.1*
Cyanogen chloride (CK)	*2.3*
(d) Choking agents	
Chlorine (CL)	*2.3*
Phosgene (CG)	*2.3*
(e) Irritants	
CS	*6.1*
CR	*6.1*
CN	*6.1*
OC	*2.2 (subsequent risk 6.1)*
(f) Biological agents and toxins	
Anthrax	*6.2*
Mycotoxin	*6.1 or 6.2*
Plague	*6.2*
Tularemia	*6.2*

Identifying Planning the Response: ***Emergency Decontamination Procedures***
(new) 3-3.4.5

Describe the procedure listed in the local ERP or the organization's SOP for decontamination of a large number of people exposed to hazardous materials.

Implementing the Planned Response: *Establishing and Enforcing Scene Control Procedures*
(add to) 3-4.1.6

Identify the items to be considered in a safety briefing prior to allowing personnel to work *at the following:*

(a) Hazardous materials incident

(b) Hazardous materials incident with criminal or terrorist activities

**The following are some examples of items to be considered in a safety briefing for criminal or terrorist related incidents:*

(a) Secondary events intended to incapacitate emergency responders
(b) Armed resistance
(c) Use of weapons
(d) Booby traps
(e) Secondary contamination form handling patients

Implementing the Planned Response: ***Performing Defensive Control Actions***
(new) 3-4.4.6

Describe procedures, such as those listed in the local Emergency Response Plan or the organization's Standard Operating Procedures, to preserve evidence at hazardous materials incidents involving suspected criminal or terrorist acts.

Technician

Analyzing the Incident: *Surveying the Hazardous Materials Incident*
(new) 4.2.1.1.6

For each of the following, describe a method that can be used to detect them:
(a)Nerve agents
(b)Vesicants (blister agents)
(c)Biological agents and toxin
(d)Irritants (riot control agents)

Analyzing the Incident: *Describing the Condition of the Container Involved in the Incident*
(add to) 4-2.2.2

Describe the following terms and explain their significance in the risk assessment process: Acid, caustic; (b) Air reactivity; (c) Boiling point; (d) Catalyst; (e) Chemical interactions; (f) Chemical reactivity; (g) Compound, mixture; (h) Concentration; (i) Corrosivity (pH); (j) Critical temperatures and pressure; (k) Expansion ratio; (l) Flammable (explosive) range (LEL & UEL); (m) Fire point; (n) Flash point; (o) Halogenated hydrocarbon; (p) Ignition (autoignition) temperature; (q) Inhibitor; (r) Instability; (s) Ionic & covalent compounds; (t) Maximum safe storage temperature (MSST); (u) Melting point/freezing point; (v) Miscibility; (w) Organic and inorganic; (x) Oxidation potential; (y) pH; (z) Physical state (solid, liquid, gas); (aa) Polymerization; (bb) Radioactivity; (cc) Saturated, unsaturated, and aromatic hydrocarbons; (dd) Self-accelerating decomposition temperature (SADT); (ee) Solution, slurry; (ff) Specific gravity; (gg) Strength; (hh) Sublimation; (ii) Temperature of product; (jj) Toxic products of combustion; (kk) Vapor density; (ll) Vapor pressure; (mm) Viscosity; (nn) Volatility; (oo) Water reactivity; (pp) Water solubility; *(qq) Nerve agents; (rr) Vesicants (blister agents); (ss) Biological agents and toxins; and (tt) Irritants (riot control agents).*

(new) 4-2.3.1.6

Demonstrate a method for collecting samples of the following:

(a) liquid
(b) solid
(c) gas

Planning the Response: *Developing a Plan of Action*

(new) 4-3.5.6

Identify the procedures, equipment, and safety precautions for collecting legal evidence at hazardous materials incidents.

Incident Commander

Analyzing the Incident: *Estimating Potential Outcomes*
(new) 5-2.2.4

Describe the health risks associated with the following:

(a)Nerve agents
(b)Vesicants (blister agents)
(c)Blood agents
(d)Choking agents
(e)Biological agents and toxins
(f)Irritants (riot control agents).

**Some examples are as follows (text added to NFPA 472 by HMEP author team):*

(a)Nerve agents

Liquids of low volatility that are rapidly absorbed through the eyes, lungs, or skin. They are highly toxic and have a NFPA 704 rating of 4/1/1 (tabun has a rating of 4/2/1). These materials inhibit acetycholinesterase (the enzyme that removes the acetyl-choline after a nerve impulse has been transmitted) in tissue, and their effects are caused by the resulting excess acetylcholine (the chemical that carries nerve impulses from one nerve cell to another). Health effect are rapid on set with symptoms of organophosphate (pesticide) poisoning.

Common Name	NFPA 704	Military Abbreviation	PEL/TWA mg/m³	LD50 (mg min/m³)
Sarin	411	GB	0.0001	70
Soman	411	GD	0.00003	70
Tabun	421	GA	0.0001	133
V agent	411	VX	0.0001	10 (percutaneous) 30 (vapor)

(b)Vesicants (blister agents)

Liquids of low volatility that are rapidly absorbed through tissue. They are highly toxic and have a NFPA 704 rating of 4/1/1. These materials cause sever burns to the skin, eyes, and tissue in the respiratory tract. Systemic poisoning can occur if significant exposure occurs,

Common Name	NFPA 704	Military Abbreviation	PEL/TWA mg/m³	LD50 (mg min/m³)
Mustard	411	H, HD	0.003	1500
Lewsite	411	L	0.003	1000-1500

(c)Blood Agents

Liquids under pressure that can interfere with the blood's ability to transfer oxygen to the cells. They are highly toxic and have a NFPA 704 rating of 4/4/2. Health effects are rapid onset of difficulty breathing, vomiting and headache.

(d)Choking Agents

Liquid under pressure that cause severe irritation to human tissue. Damage to respiratory tissue can result in pulmonary edema, congestive heart failure and death. These materials are highly toxic industrial chemicals.

(e)Biological agents and toxins

Biological Agents are generally divided into three groups:

Bacteria - single-celled organisms which cause a variety of diseases in animals, plants, and humans. They may also produce extremely potent toxins inside the body. Examples are Anthrax, Plague, Tularemia and Q fever. These agents show exposure symptoms in a period of 1-10 days and have an associated high fatality rate.

Viruses - much smaller than bacteria, and work inside individual cells. Examples are Smallpox, Venezuelan Equine Encephalitis and Viral Hemorrhagic Fever. Symptoms of exposure can be sudden to 1-3 days. Viral Hemorrhagic Fever is the most toxic of these viruses and is almost always fatal.

Toxins - potent poisons produced by a variety of living organisms including bacteria, plants, and animals. Examples are Botulinum Toxin, Staphylococcal Enterotoxin B, Ricin and Mycotoxins. Symptoms of exposure are 3 hours to 24 hours. These materials are the most toxic known substances, Botulinum Toxin is 100,000 times more toxic than Sarin, one of the well known opranophosphate nerve agents.

Common Name	*Days/Latency*	*Fatal*
Anthrax	*1-5*	*Yes*
Botulism	*2-3*	*Yes*
Cholera	*2-5*	*Yes*
Encephalitis	*2-5*	*Yes*
Plague	*1-3*	*Yes*
Tularemia	*1-10*	*Yes*

(f)Irritants (riot control agents)

solids with low vapor pressures and are dispersed in fine particles or in solution. Immediate onset of pain, burning, and irritation of exposed mucous membranes and skin. Exposure to these agents is almost never fatal to the healthy individual.

Planning the Response: *Approving the Level of Personal Protective Equipment*
(new) 5-3.3.5
Identify the limitations of military chemical/biological protective clothing.

Planning the Response: *Developing a Plan of Action*
(add to) 5-3.4.3
Given the local emergency response plan and/or the organization's standard operating procedures, identify which agency will perform the following:

(a)Receive the initial notification
(b)Provide secondary notification and activation of response agencies
(c)Make ongoing assessments of the situation
(d)Command on-scene personnel (incident management system)
(e)Coordinate support and mutual aid
(f)Provide law enforcement and on-scene security (crowd control)
(g)Provide traffic control and rerouting
(h)Provide resources for public safety protective action (evacuation or shelter in-place)
(i)Provide fire suppression services when appropriate
(j)Provide on-scene medical assistance (ambulance) and medical treatment (hospital)
(k)Provide public notification (warning)
(l)Provide public information (news media statements)
(m)Provide on-scene communications support
(n)Provide emergency on-scene decontamination when appropriate
(o)Provide operational-level hazard control services
(p)Provide technician-level hazard mitigation services
(q)Provide environmental remedial action ("cleanup") services

(r)Provide environmental monitoring
(s)Implement on-site accountability
(t)On-site responder identification
(u)Command post security
(v)Crime scene investigation
(w)Evidence collection and sampling

Terminating the Incident: *Reporting and Documenting the Hazardous Materials Incident*
(new) 5-6.4.6
Identify the procedures required for legal documentation and chain of custody/continuity described in the organization's standard operating procedure or the local emergency operating plan.

NOTE: The domestic terrorism sub-committee for NFPA Standard 473, EMS Responder Levels 1 and 2, is preparing supplemental competencies for EMS Level 1 and Level 2 responders to terrorist hazardous materials incidents. These competencies have been drafted and will be undergoing extensive national review and comment prior to their implementation. These draft competencies are displayed below for reference but will not be added to the recommended portions of the response training guidelines, Guidelines for Public Sector Hazardous Materials Training, until the competencies have been finalized by NFPA.

EMS Level 1

Analyzing the Incident
(new) 2-2.3
Identify types of locations that mav become targets for criminal or terrorist activity using hazardous materials.
*The following are some examples of locations:
(a) Public assembly
(b) Public buildings
(c) Mass transit systems
(d) Places with high economic impact
(e) Telecommunications facilities
(f) Places with historical or symbolic significance

(new) 2-2.4
Identify at least four indicators of possible criminal or terrorist activity involving hazardous materials.
*The following are some examples of indicators:
(a) Hazardous materials or lab equipment that is not relevant to the occupancy
(b) Intentional releases of hazardous materials
(c) Unexplained patterns of sudden onset of similar, non-traumatic illnesses or deaths. Pattern may be geographic, by employer, or other
(d) Unusual odors or tastes
(e) Unexplained signs of skin, eye or airway irritation
(i) Unusual security, locks, bars on windows, covered windows, and barbed wire
(g) Unexplained vapor clouds, mists, and plumes
(h) Patients twitching, tightness in chest, sweating, pin-point pupils (miosis), runny nose (rhinorrhea), and nausea/vomiting

Planning the Response
(new) 2-3.5
Identify the procedures, equipment, and safety precautions for collecting legal evidence at hazardous materials incidents.

Implementing the Planned Response
(add to) 2-4.2 (b)
List the common signs and symptoms and describe the EMS treatment protocols for the following:

(a) Corrosives (e.g., acid, alkali)
(b) Pulmonary irritants (e.g., ammonia, chlorine)
(c) Pesticides (e.g., organophosphates, carbamates)
(d) Chemical asphyxiants (e.g., cyanide, carbon monoxide)
(e) Hydrocarbon solvents (e.g., xylene, methylene chloride)
(f) Nerve agents
(g) Vesicants (blister agents)
(h) Blood agents (cyanide)
(i) Choking agents (pulmonary agents)
(j) Irritants (riot control agents)
(k) Biological agents and toxins
(l) Incapacitating agents (BZ, LSD)

(new) 2-4.4
Identify the specific actions necessary when an incident is suspected to involve criminal or terrorist activity
*The following are some examples of action:

(a) Communicate the suspicion during the notification process
(b) Isolate potentially exposed people
(c) Document the initial observation
(d) Attempt to preserve evidence while performing operational duties

(new) 2-4.5
Given either a facility or transportation scenario of hazardous materials with or without criminal or terrorist activities, the Level I EMS/HM Responder shall identify the appropriate initial notifications to be made and how to make them, consistent with the local emergency response plan or the organization's standard operating procedures.

(new) 2-4.6
Given an incident involving the suspicion of a biological warfare agent, the EMT shall

(a) Identify the correct body substance isolation procedures to be followed
(b) Identify the proper decontamination procedures in accordance with their standard operating procedures or guidelines
(c) Identify the necessary post-exposure reporting

* This is important to facilitate post-exposure prophyllaxis when available

EMS Level 2

Analyzing the Incident
(new) 3-2.3
Given an emergency involving potential domestic terrorism, the Level II Responder shall determine the availability of basic tools for identification of the substance, detection devices appropriate to the substance, and where these detection devices are available locally.

Alternative Fuels

Background:

Since the oil embargo of the 1970's, alternative fuel development for vehicles has gained a greater portion of the market share. In addition, many cities are faced with EPA clean-air standards, expressing the need to convert vehicles to alternative cleaner burning fuels. As legislation , such as the Clean Air Act, starts to become fully implemented and states such as New York and California implement their vehicle emission standards the demand for motor vehicles that operate on fuels other than gasoline and diesel fuel will significantly increase.

Many vehicles today are operating on Liquefied Petroleum Gas (propane), Compressed Natural Gas (CNG), and Methanol or Ethanol fuels. The next major materials in the propulsion market will be electric power and Liquefied Natural Gas (LNG). Personal cars and fleets of all types ranging from taxi cabs, buses, delivery vehicles, and trains are operating today in most major cities and metropolitan areas on fuels other than the standard gasoline or diesel product. Manufacturers of cars, trucks, and buses using new fuels sources is on the increase. The flexible-fueled vehicles (FFV's) can run on gasoline or ethanol, compressed natural gas (CNG), liquefied hydrogen, propane, as well as electric batteries.

All vehicles, whether powered by alternative fuel or conventional gasoline, must be certified by the manufacturer to meet federal motor vehicle safety standards (FMVSS). Even though these standards for safety are met, there has been no method developed to identify the type of fuel the first responder would be faced with.

Challenges for Public Sector Response Training

The new systems pose a wide variety of new concerns to the emergency community of fire, police, and emergency medical personnel. Electric vehicles may be using large quantities of lead-acid batteries or generating electricity of 300 volts. Other vehicles may be using methanol or ethanol fuels which require special extinguishing agents to control fires. Compressed natural gas cylinders of 3,000 pounds pressure are now located in trunks of vehicles and railroad engines are now operating on Liquefied Natural Gas supplies being pulled behind the engine in a special tank car. Filling stations across the nation are installing compressor and cascade bottle fueling systems to fuel the natural gas vehicle. Small trailer mounted cascade systems are being pulled behind vehicles to provide roadside service to those vehicles that run out of natural gas. Utility companies in New York State will soon be marketing home compressors for vehicle owners to refuel their Compressed Natural Gas vehicle in their own garage. The National Highway Transportation Safety Board has found the issue of alternative fuels significant enough to publish a special awareness bulletin alerting responders of the potential dangers of the new fuels.

Emergency response personnel need to be trained to recognize or identify vehicles with alternative fuel systems and be trained in the appropriate safety issues associated with each new fuel system. Since all the systems are using hazardous materials, it is most appropriate that the training be covered under hazardous materials curriculum.

Alternative Fuels

Providers of hazardous materials responder training should develop training or enhance existing training at the Awareness, Operations, Technician and Incident Commander levels with additional material that addresses the following concepts:

- Recognition and identification of alternative-fueled vehicles
- Chemical and physical properties for the various fuels, i.e., LPG, LNG, LH, and electro-chemical cells (batteries)
- Special response procedures and operations needed for each alternative fuel, to include:
  - Personal Protective Equipment (PPE)
  - Suppressant Agents
  - Container Breaches (i.e. fuel or battery leakage)
  - Victim Extrication and Treatment
  - Scene Evacuation
  - Incident Management System (IMS) Special Considerations
  - Mitigation and Clean-Up Requirements
  - The potential for Boiling liquid/Expanding Vapor Explosion (BLEVE)

Carbon Monoxide Response

Fire department units may encounter carbon monoxide in many different situations and incident types. These settings can range from small dwellings to large industrial facilities. CO gas will be produced from all forms of combustion that involve carbon-based fuels. Concentrations will be dependent on the type of fuel and the form or efficiency of combustion. In recent years, these incidents have been on the increase in urban as well as rural areas.

Carbon monoxide is an invisible, odorless, tasteless, and colorless gas that has the same density as air and will not float or sink, but will disperse throughout a structure.

Carbon monoxide gas is a chemical asphyxiant and will replace oxygen in the bloodstream, resulting in suffocation. This gas also has a wide flammable range; from a lower explosive limit of 12.5% in air to an upper explosive limit of 74% in air. It has an ignition temperature of 1128 degrees Fahrenheit. The National Fire Protection Association (NFPA) fire diamond will show CO as a 3 in health, a 4 in flammability, and a 0 reactivity.

The primary hazard of carbon monoxide gas is that of an asphyxiant with relatively low levels producing adverse health effects. These effects can range from mild headache after two hours of exposure to 200 parts per million (PPM) to unconsciousness after 30 minutes exposure to 1600 PPM. OSHA has set a level of no more than 35 PPM as an allowable workplace standard for an 8-hour day, and the EPA has established that residential levels should not exceed 9 PPM over an 8-hour average.

Symptoms from exposure to lower level concentrations include headache, nausea, dizziness, weakness, difficulty breathing, and other flu-like problems. Exposure to high levels will cause cyanosis, hallucinations, angina, and unconsciousness. Any patients suspected of having CO poisoning shall be moved to a fresh environment, placed on high flow O_2 and transported to the closest medical facility.

Residential CO problems can normally be traced to problems that include, but are not limited to, the use of gas furnaces, gas dryers, gas stoves, fireplaces, kerosene heaters, bar-b-que's, or vehicle that are running in or near the structure. Indications of incomplete combustion from gas burning appliances include yellow flame, soot build-up on roof vents, and soot build-up on interior walls. All possible sources shall be checked, and certified repair technicians shall be called as necessary. Southwest Gas shall be notified if any signs or symptoms of CO poisoning are exhibited.

Industrial CO problems can be associated with large furnace type operations, large scale equipment that utilize combustion type engines, or leaks from cylinders that contain compressed carbon monoxide gas. Any operation of an internal combustion engine in a confined space without adequate ventilation will create a highly dangerous and life-threatening environment.

Residential CO detectors are available and will sound two types of alerts. The first is a warning chirp that notifies there is a developing or chronic CO problem that will produce a 4-7% carbon monoxide in blood hemoglobin level over time. In the event of a warning signal, the residence should be ventilated, the test button should be pushed, and all possible sources of CO shall be checked and adjusted or repaired. The warning level is set at 60 PPM CO for greater than 66 minutes. The second alert is a full alarm that warns of levels that will produce 8-10% carbon monoxide in blood hemoglobin levels. The detector will alarm at these three points: 100 PPM will trigger an alarm within 90 minutes, 200 PPM will trigger an alarm within

35 minutes; and 400 PPM within 15 minutes.

A full alarm indicates that dangerous levels of CO have been reached and that immediate action should be taken. These actions include evacuation, ventilation, investigation, and denying access until the source of the CO is secured.

Additionally, the increased use of CO detectors has resulted in many local responders (fire, police, and EMS) being burdened with numerous calls but without a clear and definitive standard operating procedure (SOP) and proper training. Many published SOPs conflict with each other. It is reported by American Medical Association (AMA) that CO is responsible for 800 to 1,000 deaths per year and some 10,000 people seek medical attention.

Challenges for Public Sector Responder Training

Most current Awareness and Operations level training programs do not address this issue sufficiently. Provider of hazardous materials response training should enhance training for the first responder at the awareness and operations levels with material and competency instruction on the following topics:

- CO hazards and toxicity
- Limitations of home detectors
- Limitations of responder carried monitoring devices
- CO recognition and identification, including signs and symptoms of CO poisoning;
- Proper entry procedures and techniques,
- Evacuation, ventilation and source investigation procedures
- CO source control and management
- Post incident action and follow-ups.

Training should also be supported by appropriate standard operating guidelines for first responder A sample of an SOP is provided below.

All CO detector alarms shall be addressed as an emergency until no hazard has been identified. Steps taken shall include, but are not limited to:

- *Verify detector is CO type*
- *Check for CO related symptoms and evacuate structure as necessary*
- *Check power supply to detector*
- *Assess scene for CO sources*
- *Determine need for additional resources: Haz mat or other units for CO meters, utility company, police department, etc.*
- *Utility company shall be notified if any signs or symptoms are present.*

CLANDESTINE DRUG LAB OPERATIONS

During routine emergency responses to fires or other emergencies it is possible that responders will discover the presence of a clandestine drub laboratory. Clandestine drub laboratories by their nature are disguised and are often encountered accidentally in a great variety of situations, including warehouses, store fronts, apartment buildings, single family dwellings, rural outbuildings and even truck trailer accidents. It should be generally understood that response to a clandestine drug laboratory is a hazardous materials incident. These types of incidents may expose you to toxic, flammable, explosive, and corrosive atmospheres. Without proper training, your health and safety are at risk.

Proper personal protective equipment at a clandestine drub lab incident is absolutely critical for avoiding exposure. Structural fire fighting or EMS gear offers little, if any, protection in such situations. In order to be able to recognize when you are inadequately protected, you must be aware of the limitations of your clothing and SCBA. You must understand that clothing which is adequate in one situation may be inadequate or even dangerous in another. No one protective clothing system will protect you from all situations.

In any emergency situation involving clandestine drub labs there is a risk of exposure to toxins; those materials that are capable of causing injury or death when absorbed. Through an understanding of the types of toxins, their effects, the various routes of entry, and specific biological hazards, emergency response agencies can take more appropriate actions to ensure their own health and safety during clandestine drug laboratory operations. In addition, it should be noted that effective clandestine drug lab incident response requires a well-functioning Incident Management System (IMS). Operating without an IMS or without a complete understanding of how an IMS works is inefficient and dangerous to all agencies involved. Listed in the guidelines are the current OSHA and NFPA laws and standards that apply to emergency response agencies who respond to hazardous materials incidents. Below is a discussion of the application of those hazardous materials competencies to the special hazardous materials response challenges posed by clandestine drug lab operations.

Learning Objectives

The following learning objectives *should be the minimum in any* Clan Lab Course. Upon completion of the course, participants will be able to:

- Discuss terminology associated with drug labs (glossary).
- Discuss history of clan labs.
- Demonstrate, through chemical reaction and/or video format, the possible catastrophic results of chemical interactions and reactions.
- Be familiar with the hazards associated with drug lab operations.
- Be familiar with some chemicals found at a drug lab operation.
- Explain the need for a personal protective equipment program for fire, police, and EMS personnel.
- Explain the routes of exposure and toxicological effects of short term exposures (acute) to these precursor chemicals and the possible long term (chronic) effects of clan lab chemicals on the human body.
- Discuss the federal laws and national standards associated with the use of PPE and chemical response programs.
- List common locations of clan lab operations.
- Explain the needs for well-established standard operating procedures within the fire department and between other agencies.
- Describe, through generic standard operating procedures, the operational goals and objectives for each of the following organizations:
  - Fire Department (First Responder)
  - Fire Department HMRT (Hazardous Materials Response Team)
  - Local Police
  - EMS

- Speak to the issue of responsibility for clean-up and termination of a clan lab incident.
- Explain the importance of scene management at a clan lab incident.
- List the common components of an Incident Management System.
- Overview decontamination procedures.
- Overview termination procedures.
- Explain why post-incident analysis and evaluation are necessary elements of scene management.

Competencies

The student will be able to:

- Name at least three general hazards associated with drug lab operations.
- Select from a list of chemicals those most commonly found in drug lab operations.
- Name two catastrophic results of chemical interactions at drug lab operations.
- Describe his/her standard operating procedures for dealing with drug lab operations and name the contact personnel from at least one law enforcement agency that they would most likely deal with.
- Describe at least two key elements of a PPE program.
- Explain the biological side effects of exposures to precursor chemicals used in illicit drug labs and express the possible acute and chronic effects of exposures to these chemical environments.
- Generally describe the overall operational goal and objectives of the following organizations:
  - Fire Department (First Responder)
  - Fire Department HMRT Units
  - Local Police Department
  - EMS
- Describe the need for establishing clean-up and termination responsibilities.

STIMULANTS

Stimulants are compounds which affect the central nervous system by accelerating its activities. Stimulants are either natural or synthetic. An example of a synthetic would be methamphetamine and a natural stimulant example would be adrenaline.

A. Natural

The first natural stimulant discovered was epinephrine (adrenaline), a substance found in adrenal glands of animals. Its effects were first discovered in 1899.

B. Synthetic

In 1919, a Japanese chemist developed the first synthetic stimulant, methlamphelaime. In 1927, a substance called 1-phenyl 2-aminopropane and its action were first described leading to the further research and development of benzedrine and dexedrine (common drugs used during the late sixties and early seventies for weight control).

CLANDESTINE DRUG LABS

The following general information is based on Drug Enforcement Agency (DEA) Special Agent Patrick Gregory's testimony before the California Select Committee on Drug and Alcohol Abuse on November 15, 1985.

On a national average, one of five (or twenty percent) of all clandestine laboratories result in, and/or are discovered through, fires and/or explosives. During 70 clandestine laboratory investigations, ten percent involved agents being confronted by suspects who had fully automatic and silenced weapons and some form of booby traps or explosive devices. In thirty percent of the cases, defendants were using electronic counter-measures, ranging from scanners to sophisticated video monitors to sound sensing devices.

During the course of these investigations, thirteen firefighters and four police officers required medical treatment as a result of exposure to hazardous chemicals and chemical wastes. Minor injuries resulted from exposure to hazardous chemicals and chemical wastes. Because of exposure to caustic, corrosive, carcinogenic, irritating, explosive, and flammable substances encountered at lab sites, every agent has suffered minor injuries including burns, rashes, headaches, light headedness, and nausea.

The first lab seized in California was in 1963 (amphetamine) in Santa Cruz.

1984 - 93 labs seized in California
1985 - 215 labs seized in California
1986 - 325 labs seized in California
Of the 325 labs seized in California, 293 were Methamphetamine. Of those 293 labs, 82.5% were using Ephedrine as the primary chemical.
1986 - 509 labs seized nationwide
1987 - 489 labs seized in California
1987 - 682 labs seized in the United States
1988 - Approximately 1,200 laboratories were seized by law enforcement agencies, federal, state, and local police nationwide.

Clandestine Drug Laboratories remain the principle source for methamphetamine. States where most clandestine laboratories appear to be operating are:

- Southern and Northern California
- Eastern Texas
- Oregon and Washington
- New Mexico
- Florida
- Pennsylvania
- New Jersey

TYPES OF LABS AND HAZARDS

A. Extraction Labs

This is where raw plant material is changed into a finished drug by the use of chemical solvents and/or acids. The chemical structure of the drug is not altered. Some examples of this are marijuana to hashish, opium to morphine.

Also under this title are indoor or underground confined space marijuana grow farms. Marijuana grow farms have a high rate of booby trap. They grow marijuana in confined space grows so that they can reduce the oxygen levels in the grow area, making the plant produce more sap, which means more tetrahydrocannabinol (THC). This is accomplished by flooding the confined area with either carbon dioxide or propane. Both gases will displace the available oxygen, and, in the case of propane, produce a possible flammable and explosive atmosphere. Without instrumentation, the firefighter has no way of evaluating the hazard, which is O_2 deficient and possibly flammable. If faced with a rescue, these confined spaces should be approached according to OSHA's proposed Confined Space Protocol 29 CFR 1910.146.

B. Conversion Labs

Currently thought to be the most prevalent. In these labs, a raw or unfinished drug product is changed into a finished or refined drug. Here the chemical structure is changed. Examples of this are cocaine base to cocaine hydrochloride (the white powder sold on the streets as cocaine), and cocaine hydrochloride to cocaine sulfate (aka crack or rock cocaine). Numerous flammable liquids, corrosives, acids, and bases, as well as oxidizing agents, are found at these sites.

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Realistic Approaches to Rural and Frontier Hazardous Materials Risk Management

Introduction

Hazardous materials risk management had early origins as an outgrowth of concern over protection of the public from major disasters and emergencies. Because of need, the natural evolution over time has been to expand the national focus from large, infrequently occurring fixed-facility disasters in heavily populated areas to the more realistic threats of smaller, more commonly occuring transportation and small fixed-facility incidents that are ever-present throughout the nation.

However, many of the principles and concepts of hazardous materials risk management today retain critical presumptions of levels of available resources that are true for large industries and large, well funded communities, but are unfortunately not true for most of the smaller communities nationally. This is a growing national challenge that needs to be addressed. Small jurisdictions, especially rural and frontier communities, do not have the tax base, financial resources or personnel needed to manage their hazardous materials risks in the same manner as larger, more affluent urban and suburban jurisdictions.

Rural and frontier communities nonetheless often have considerable hazardous materials risks that must be addressed, in spite of the limited resources to do so. Transportation accidents, for example, occur along routes that cross rural and frontier jurisdictions with no less frequency (and by some measures with considerably greater frequency) than they cross urban or suburban areas.

What is needed is an alternative approach to hazardous materials risk management that will address these risks while at the same time accommodating the limited resources and other unique parameters and capabilities of rural and frontier communities. The following concepts and strategies are offered to support such an alternative approach, and address an introduction to the unique character of rural and frontier communities as well as proposing realistic strategies for managing hazardous materials risks in these environments. The strategies proposed are drawn from the successful practices of a number of rural and frontier jurisdictions who have undertaken to develop their own unique methodologies for preparing for and responding to hazardous materials emergencies.

The Social Cost of Space

As Americans, we honor space. Even those Americans who live in metropolitan, urban and suburban areas love to speak of wide open spaces and annually vacation in America's hinterland to camp, fish, hunt and hike. However, residents who live permanently in the extremely rural and frontier areas of America often must pay a price for the experience. Sociologists and anthropologists call this price the "social cost of space". This cost is measured in terms of services, accessibility, standard of living, social events and other necessities, which are significantly less available in rural areas than in metropolitan areas.[1]

The underpinnings of the social cost of space are manifest to any visitor to a small town with diminished industry, population, commerce or tax bases. From an emergency preparedness perspective, this cost is reflected in a significant reduction of the services, skilled technicians, bureaucratic organizations, and technological systems necessary to maintain the high level emergency services "standards of care" that urban centers enjoy.

[1] See: A.H. Anderson, "Space as a Social Cost," *Journal of Farm Economics,* Volume 32, No. 3, 1950; and Carl Kraenzel, "Sutland and Yonland Setting for Community Organization in the Great Plains," *Rural Sociology,* Vol. 18 (1953), pp. 344-58.

This social cost of space is also reflected in important cultural differences in local management systems, techniques and terminology. These cultural differences drive the style and programs of emergency management and preparedness in rural and frontier communities. The diminished resources and limited time available force all participants to attend only to high priority issues of immediate and very real impact, and there is little tolerance or support for external mandates or requirements that are not seen as having an immediate local importance or impact. To be effective, all local emergency management programs, initiatives, and actions must pass the test of immediate actual relevance to current local affairs or problems before they will be undertaken in rural and frontier communities.

This social cost of space determines the realities of what can and cannot be done in hazardous materials risk management in rural and frontier communities. These realistic limitations give rise to a number of complex questions and issues that need to be addressed, such as the viability of alternative standards of care, alternative levels of acceptable risk, and alternative, more streamlined procedures for hazardous materials risk management and control.

Rural and Frontier Communities: Government Concepts, Definitions and Programs

There are many different definitions used to describe and discriminate between frontier, rural and urban areas. These definitions are used for different reasons by different programs, different federal and state agencies, and different disciplines, and there is no single criteria in use nationally with which everyone agrees. For example, “frontier” and “extremely rural” are defined by population density of ten or fewer persons per square mile by the U.S. Department of Health and Human Services (DHHS), for standards of care analysis purposes. By contrast, the U.S. Bureau of the Census, for the purposes of statistical census analysis, defines “urban” as comprising all territory, population, and housing in areas and places of 2,500 people or more, and defines “rural” as everything else. There are also many definitions in use that depend upon factors other than population size and density, including measures of proximity to and relationship with urban areas, measures of the degree of urbanization, and geographical area classifications by principle economic activity.

Regardless of the definitions used, it is generally understood that there are important differences in the economic, public services, and personal lifestyle characteristics of rural and frontier areas. In addition to having a smaller economic base than urban areas, rural and frontier areas also receive less external financial and services support from federal sources, which accentuates the gap between rural and frontier resource bases and those of urban areas. Because of population served, urban and metropolitan areas have historically been the primary targets of federal programs and activities, including dialogue and input regarding national standards of care and standards regarding affordable minimum levels of service. So rural and frontier areas are often held to unobtainable standards of care requirements that are affordable only with urban-level resources and services.

However, there is a growing understanding of the need to address this challenge nationally. The DHHS and the U.S. Congress have taken the lead in developing the concept of “frontier” status and promoting the need for a separate but adequate standard of care for extremely rural areas.[2] Many state governments and agencies with extensive rural and frontier areas within their jurisdiction have also been attempting to address these issues. For example, the Montana Disaster and Emergency Services has adopted the frontier designation as defined by the DDHS in an attempt to emphasize the extremely rural nature of most of its counties. To be eligible for DDHS Bureau of Health Care Delivery and Assistance support as a frontier area, the following service area criteria must be met:

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[2] U.S. Department of Health and Human Services, Public Health Service, Health Resources and Services Administration, Bureau of Health Care and Deliver Assistance, “Primary Care Activities in Frontier Areas - Regional Program Guidance Memorandum 86-10,” unpublished memorandum, Rockville, MD June 10, 1986; Laura Summer, “*Limited Access: Health Care for the Rural Poor,”* Center on Budget and Policy Priorities, Washington, D.C., March, 1991; and Congress of the United States, Office of Technology Assessment, Rural Health Care, “*Defining ‘Rural’ Areas: Impact on Health Care Policy and Research,”* July, 1989.

Service Area: a rational area in the frontier will have at least 500 residents within a 25-mile radius of the health services delivery site or within the rationally established trade area. Most areas will have between 500 and 3,000 residents and cover large geographic areas.

Population Density: the service area will have six or fewer persons per square mile.

Distance: the service area will be such that the distance from a primary care delivery site within the service area tot he next level of care will be more than 45 miles and/or the average travel time more than 60 minutes. When defining the "next level of care" we are referring to a facility with a 24-hour emergency care, with 24-hour capability to handle an emergency caesarian section or a patient have a heart attack and some specialty mix to include at a minimum, obstetric, pediatric, internal medicine and anesthesia services.[3]

How Much of the United States is frontier and rural, and what is the significance to hazardous materials transportation?

The map delineating frontier areas by county shows that about one third of the geographical area of the U.S. can be categorized as frontier.[4] The map showing non-metropolitan areas and percent rural population suggest that, in addition, well over another third of the U.S. is rural.[5] The combination of these two areas suggest that close to three fourths of the geographical area of the U.S. is frontier and rural.

Although by definition these areas serve a only a minority of the population of the U.S., the fact that most of the U.S. is frontier or rural is of key significance to hazardous materials transportation. It is extremely important to note that, from a hazardous materials risk management perspective, **the majority of all hazardous materials transportation routes lie in rural and frontier jurisdictions**.

It is recognized that past commodity flow studies and other risk assessments have indicated that risk of accident in concentrated urban areas is greater, especially those with a preponderance of fixed facility hazards, and that, by definition, the risks to the population are greater in urban areas. So there has been good justification nationally for past priorities to focus hazardous materials risk management on these threats. However, it must also recognized that rural and frontier areas today present a major un-met national transportation risk and challenge, and that this challenge is greatly accentuated by the diminished resources and lack of infrastructure in rural and frontier communities to support appropriate hazardous materials planning and response.

The Effects of Low Population on Rural and Frontier Response Organizations

In order to develop more effective strategies for rural and frontier hazardous materials risk management, it is critical to first understand the characteristics of local emergency management and response. A typical rural town has a mix of governmental and quasi-governmental groups, including those functional areas related to emergency and hazardous materials response: fire, law enforcement, emergency medical services, public works, public health, emergency management and elected public officials.

Fire: VFD, or Volunteer Fire Department, is the typical fire organization. There might be other types of districts, other names, other acronyms, but what exists, basically, is a group of individuals who volunteer their time to provide the community's fire protection services. They train, on their own time, they fight fires on their own time, and they volunteer time to fund-raising, which is often the only financial support for the response organization. Occasionally there may be a paid Chief, sometimes there are a few paid fire fighters along with lots of volunteers, but the heart of rural and frontier fire-fighting efforts is the volunteer sector, and it is structural.

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[3] DHHS, "*Primary Care ...."*

[4] See Figures 1, map from DHHS, "*Defining Rural Areas . . . "* on frontier counties in the U.S.

[5] See Figures 2, 3 and 4, maps from DHHS, "*Defining Rural Areas . . . "* on metropolitan and urban population sites, with the remainder being rural and frontier areas.

In tandem with the volunteer structural department there may be a wildland/forestry fire crew and often a county road crew, that fights wildland fires. These crews typically can assist in domestic fire-fighting only in limited support roles. Occasionally, depending upon the geographic location, there may be a nearby military fire fighting contingent or an industrial fire brigade that can lend a hand, but with few bases or industries, these are rare.

This is the frontier fire fighting reality, minimally equipped and trained volunteers, often using hand-me-downs from regional paid departments, who are paged, leave their place of employment, drive to the fire house, take the truck with equipment to the scene, and fight what's left of the fire.

Law Enforcement: Typically, organization consists of very small police departments with small jurisdictional areas, typically within the city limits. These departments work in conjunction with sheriff's offices with large jurisdictions and insufficient staffing. Within the large geographic area of frontier counties, the officer-per-square-mile is minuscule. Given the fact the average population is less than six persons per square mile, many western areas must count on cross deputizing and mutual aid with local game wardens, highway patrol officers and tribal police to supplement local jurisdiction law enforcement officers.

Emergency Medical Services: There is a wide variety of EMS providers in extremely rural areas (volunteer, clinic, private, fire, etc.), but they all suffer from the same problems: lack of money, lack of technicians, lack of equipment and lack of volunteers. Some "hospital runs" can cost a volunteer a whole day's work. Tourists can overload systems set up for locals, drying up the volunteer base. Higher and more complex competencies make training requirements unmanageable on a volunteer basis.

Public Health: While EPA office personnel may be very familiar with acronyms like RCRA, EPCRA, CERCLA, CAA, CWA, OPA and even OSHA, it is more likely that a rural or frontier county sanitarian or code enforcement officer will be familiar with spending the day inspecting septic tanks and restaurants rather than going through hazardous materials or hazardous waste regulations. Some rural and frontier counties do not have permanent sanitarians. Many counties share sanitarians, some hire them on an as-needed basis. With their overwhelming workload and local customer focus, they have little time for, what from their perspective would seem to be, intrusive and unfunded federal mandates.

Public Works: Public works personnel should be welcomed players at emergency incidents. They are used to working outside, on streets, roads and highways. They have emergency equipment, barricades, etc. Unfortunately, while a county or state may have a great deal of equipment and operators, it is spread out. The result is that very little equipment and personnel are available locally in a small town.

Emergency Management: Emergency management is a low priority in a rural and frontier city or county government. The majority of local emergency managers are part time. Most have many other duties, with other duties being known to include safety officer, coroner, junk vehicle officer and floodplain manager. The number of management courses needed to make a good emergency manager from scratch would use up all of a part timer's hours for two years. Yet, the position is critical to emergency management and hazardous materials risk management activities in rural areas.[6] It might even be said that without an effective local emergency manager, the odds are extremely low for having a good hazardous materials or emergency management program.

Elected Public Officials: County commissioners, mayors and even sheriffs are high among the leadership of local communities. They usually are ranchers, farmers, businessmen, miners, loggers, etc. They are workers, not managers. They have the final say regarding many activities of governmental and quasi-governmental activities, yet they often have little experience to prepare them for their regular governmental duties, and usually lack the qualifications necessary to delve into disasters and hazardous materials emergencies.

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[6] See Frederick J. Cowie, Ph.D., *Hazardous Materials Risk Management in Extremely Rural Areas,* 1993.

Toward Realistic Approaches to Rural and Frontier Hazardous Materials Risk Management

Federal programs, such as EPCRA and other SERC-LEPC initiatives, presume the existence of local emergency planning committees (LEPCs). This theory presupposes the existence of an industrial tax base, paid responders, training on company time, adequate equipment and a variety of other luxuries.

Frontier facts are simple. There are probably no or few paid responders, outdated or nonexistent equipment, no tax base, no time to train and no active local emergency planning committee. The amount of time, effort, and money requisite to produce a trained, equipped, planned and exercised response community is beyond the scope of most rural and frontier communities.

The EPA has funded at least one project designed to address the problems of frontier LEPCs[7], but there are still extensive challenges stemming from the fact that most frontier LEPCs exist only on paper, if even there. The EPA has had some success in creating coordinated hazardous materials response and risk management where none existed, yet this success is geographically intermittent. Much has been done, but the vast majority of the work lies ahead. In rural and frontier areas, the chances of a truck carrying hazardous materials having an accidental release within the jurisdiction of an active LEPC or within the jurisdiction of a local hazmat team are extremely poor.

Some frontier and rural states have programs and projects designed to develop active frontier LEPCs, but these programs tax the perseverance and creative skills of personnel, because of insufficient staff, time, and resources. The work that needs to be done, needs to be done effectively, efficiently and with a minimum of wasted effort and duplicated efforts.

Some approaches work better than others, some approaches have proven successes, some approaches are worth using while others can stifle any embryonic LEPC development. The following techniques and suggestions drawn from successful practices in rural frontier environments, are presented as possible alternative strategies for rural and frontier hazardous materials training and program management.

Sample Recommended Practices:
An Alternative Approach to Hazardous Materials Risk Management Training in Rural and Frontier Areas

1. Start with Baseline Chemicals, Hometown Chemicals

The greatest challenge in developing a hazardous materials program with volunteers in rural and frontier communities is to make it relevant. Volunteers will not give up an evening, a weekend or a minute to hear about make-believe scenarios or federal mandates. Success, to date, in small towns with volunteers has been by the use of next-door chemicals. Failure has been catastrophic when the emphasis has been on catastrophic events and trainloads of extremely hazardous substances. The fight can't be won with theory, it can be won with facts.

Using a flip chart[8], a skilled facilitator can draw out of the local group the list of chemicals in their town that can hurt them, their kids, their parents, their friends. It does not matter what the list ends up being, because it will be real and it will be a starting place they can relate to and live with, since they do everyday! The baseline chemical list will look something like this:

- gasoline
- diesel
- LPG/propane
- acids/bases
- natural gas
- chlorine
- pesticides/poisons
- explosives

[7] Frederick J. Cowie, Ph.D., *Developing Realistic LEPCs in Extremely Rural (Frontier) Areas*, 1994.

[8] Use technology comparable with that available locally to your audience. Flip chart is comparable to the clip board you will find in small towns. No fancy computer programs, please!

- crude oil
- anhydrous ammonia
- paints/solvents
- household chemicals

This list should be, will be, real to local fire fighters, local responders, local industrial folks. These are everyday chemicals in everyday towns. Luckily for trainers and planners, unluckily for citizens and responders, these pretty well cover the gamut of hazard classes, at least well enough to develop a baseline set of hazards. It is good to point out at this point that we are a chemical-based society, that chemicals are the reason our society is as it is. That is not to say it is good or bad, right or wrong, but that is just how it is. Chemicals are on the roads and rails, because they are destined for facilities in our towns that need them. These are the transportation industries and fixed facilities that hire our friends and neighbors, that support our communities, that make America work. The chemicals are the chemicals of modern life, even in frontier America. Let's look at them:

Gasoline: It's everywhere; flammable liquid; fairly low flash point; kills a lot of people; causes a lot of property damage; comes in large quantities; has recognizable industry names; corner filling stations. Frequent large releases, often to do with highway traffic accidents, or smaller releases due to overfills at delivery sites.

Diesel: It's everywhere; fairly high flash point; large number of small releases due to saddle tanks on trucks involved in traffic accidents.

LPG/Propane: It's the heating fuel of choice in rural, camping and barbecuing America; comes in varying sized containers; distribution sites in or near all small towns; infamous from Kingman, Arizona; associated with BLEVEs; a lot of it on the road; a liquefied-gas, looking for space, air.

Acids/Bases: Lots of acids used in refining and manufacturing; corrosives; eat their way to a more neutral pH; comes in large and small quantities; lot of it on the Interstates.

Natural Gas: Rarely on lists; explodes, burns, asphyxiates; infrastructure often old; releases often caused by backhoes; gathering lines and pipeline facilities.

Chlorine: A killer; basic manufacturing chemical; basic water purification chemical; large and small cylinders; lots of rail cars; municipal swimming pools.

Pesticides/Poisons: Including herbicides, fungicides, etc.; on seed wheat and potatoes, etc.; lots of it on roads at certain times of year; designed to kill; store in co-ops in or near all small towns.

Explosives: Unexploded military ordnance; old nitroglycerine and dynamite; high school chemistry labs; terrorist activities.

Crude Oil: Large quantities; production-area specific; environmentally nasty; very high flash point.

Anhydrous Ammonia: No water content, therefore hydrotropic (water-seeking); corrosive; inhalation hazard; distribution sites in or near all small towns; nurse tanks pulled by pickups.

Paints/Solvents: Everywhere; hardware stores and car parts stores; dry cleaning and automotive; many carcinogenic; flammable liquids.

Household Chemicals: Cleaning products; drain cleaners; charcoal starter; paint thinner; old stuff nobody knows what it is any more, and so on.

It should always be remembered that there rarely are either historical or zoned areas for chemicals in small towns. Hazardous materials distribution points are often in close proximity to residential areas, schools, retirement homes and medical facilities, often downwind in the pathway of prevailing winds. Once the frontier community firmly believes that there are hazardous materials next door, next door to their kids and spouses and parents and friends, then they can be moved to the next step, human pathways for chemicals, good and bad.

Pathway examination is critical to elevating the consciousness of small communities about hazardous materials. It humanizes and personalizes what is otherwise a technical nightmare. Humans intake air or food or liquids in four ways, and they intake hazardous materials in these same four ways, hazardous materials that can maim or kill them. If the emphasis is placed on the humans, the citizens, the responders, the industry employees, there is a much better chance at success, a much higher acceptance ration, than if the left-brain, technical side is overemphasized. [Technically-oriented trainers tend to over-chemicalize hazardous materials incidents, thus the following pathways section may be given first to humanize hazardous materials incidents.]

2. Entrance to the Human Body: Four Pathways

It is critical to emphasize in every way that they, the responders, citizens, industry employees, are the most important things: not chemicals, not management systems, governments, structures or highways. Emphasize that the way their body takes in food, water, oxygen, etc. is going to be the exact same way it takes in carbon monoxide, poison, etc. Prove to them that they have to understand themselves in order to stay safe. Discuss the four pathways, parallel them to environmental area for further emphasis. Show the environmental as a secondary safety problem, long term safety problem, yet a safety problem indeed. **Safety first, and it's their safety!**

1. Inhalation: Breathing, in and out. Have them actually do it forcefully. Explain to them that this is a pathway and that does not differentiate the kind of hazard in that pathway. It could be a corrosive, a poison, an asphyxiant. The results would be different, all bad. Remind them that their body will breath, in and out, automatically. They can't stop the pathway. Environmentally, contrast clean air with air pollution.

2. Absorption: Something on the skin, slowly moving through the skin, past the muscles and into the blood stream. Again, it could be different hazards using the same pathway. Environmentally, this can be compared with percolation through the soil into the aquifer.

3. Ingestion: Eating or drinking is the usual idea. But people don't usually eat or drink hazardous materials straight, but they could be swallowing contaminated saliva. Children could be playing on contaminated dirt. All swallowed material goes into the digestive tract. Environmentally similar to dumping something directly into the stream or river.

4. Injection: Needle injection often comes up, but at incidents it is usually either done via new or old cuts, abrasions, punctures, etc. This speeds up, through a more direct pathway, the entrance into the blood stream. Environmentally similar to a release near a wellhead that siphons material directly into the aquifer.

This creates a good teaching paradigm necessary for good training: Participants identify **both with** their own personal human body functions **and with** the chemicals which exist next door to them, their loved ones and their friends.

3. Personal Protective Equipment (PPE) in Frontier Areas

A person's past history, experiences, and training are far more important in changing behavior at hazardous materials incidents than is new data. Therefore, a trainer or facilitator, in order to be effective and change behavior, must address the standard incident comfort level of the responders, especially in rural and frontier areas. The local responders are not professional data managers used to manipulating abstract concepts. Deal with them where they are. Ask them for examples of personal protective equipment (PPE) they have and what it protects them against. A list might contain some or all of the following. Law enforcement: vests/bullets; latex gloves/blood borne pathogens. Fire: Bunker gear/some heat and flames; SCBA/airborne hazards. EMS: latex gloves/blood borne pathogens; goggles/blood borne pathogens, projectiles. Public works: leather gloves/scrapes, cuts. Public health: latex gloves. Emergency managers: Hard hats/things that hurt their heads.

Once they are comfortable explaining their PPE (they may have never used this phrase or acronym before), ask them to review the baseline chemicals and the four pathways. Then lead a discussion of PPE for hazardous materials incidents. Let the group come to the conclusion that they virtually have no protection against chemicals, except the firefighters and their SCBA in relation to inhalation hazards. What about simultaneous inhalation and absorption hazards or corrosives? Is the bunker gear really helpful at a hazardous materials incident? Are there false senses of security and protection?

Provide them with an understanding of the four levels, A-B-C-D of PPE according to EPA and OSHA. Have them discuss where they personally fit on the A-D scale, which for the most part is the "street clothes" level. Then gently advise them that their PPE is **distance**, pure and simple. Distance moves their own, individual four pathways away from the chemical processes involved in the incident. They can understand this. They may want to do something. They may want "hands on." But what they need is to be safe.

*4. North American Emergency Response Guide (NAERG) **in Frontier Areas***

With regards to safety, the most important document in hazardous materials response in rural and frontier jurisdictions is the NAERG. It is an accepted national standard of care. It is that standard against which incident response will most likely be measured by post-incident authorities. It is universally available, it can be adopted and should be adopted as the transportation incident response plan by jurisdictions, volunteer and paid fire departments, law enforcement, EMS, public health, public works and emergency managers, in lieu of oral or non-existent plans. Yet, it is not often marketed well. However, if it is introduced to the response and planning community here, after the baseline chemicals, four pathways and PPE/distance, then it is accepted as a **necessary and appropriate** guide to initial response, hands down.

Why? Because the appropriate question, after distance is described as personal PPE in frontier areas, is "What Distance?" The answer for NAERG chemicals is in the Guides. Safe distance is the hook to get their interest, then one can do NAERG training. Once they understand how to determine the **isolation** radius, how far to get people out and how far to keep new people away, then they can proceed to other parts of the Guides: Potential Hazards, Protective Clothing, Fire, Spill or Leak, First Aid, etc. This is a user-friendly, foolproof system. They can be shown the green pages with their isolation and protective action distances and water-reactive tables and the white pages with the data management ideas and narrative sections. But if they don't see how this is important to them personally, individually, then they will not use it. And the way to get them to use it is to get them to buy into **personal safety first, then public safety!**

5. Don't try to sell ICS (Incident Command System): Use tabletop exercises with realistic scenarios to develop locally-intelligible incident management from the chaotic ground up.

The resistance to management training in general, and ICS training in particular, in rural and frontier areas is legendary and well-founded. Many governmental, managerial and developmental ads have come and gone. Time-restricted local responders don't want another three-letter acronym to put in the trash with MOB, TQM and MBA. In rural areas, any medium-sized to large incident, especially highway incidents, demands the use of a management system. Let the incident scenario demand management help, it can do it by itself. Use the five basic operational response areas: fire, law enforcement, EMS, public health, public works.

It has been found that in rural and frontier areas, everything is done with neighbors, mutual aid and outside help. There are just not enough locals to go around. The fire lead may be the local VFD, but there usually are two or three mutual aid VFDs involved, plus a county wildland fire crew and maybe one from state forestry. The law enforcement lead may be the county sheriff's office, but they need help from city police, state highway patrol, game wardens, and in the west, tribal police, FBI and ATF. Public works lead may be either county roads or state highways, but each needs the other and sometimes city street crews' help. One county public health nurse or sanitarian can't handle a big incident, so city or state folks are called in. In addition, local, county and state emergency managers, public officials and industry personnel may be needed.

Let this group of fifteen or twenty agencies, which are necessary to handle a not-uncommon incident, demand a management system and the responders will beg for help. When someone comes to help, don't let them bring tomes of professional looking ICS/NIIMS documents. All a frontier or rural responder or manager needs is the basic concepts: Span of control and a logical differentiation of roles. Roles: Incident Commander (or Unified/Joint Command); Commander support (Liaison, Safety, Public Information); Operational Support (Logistics, Planning, Finance) and Operations (Fire, Law enforcement, EMS, Public Works, Public Health, Other).

Demonstrate that the Incident Commander and the Operations Chief need to be managers, perhaps with an operational specialty, but the emphasis has to be on management skills and not specific operational expertise. Explain the need for perspective, reflection, data management, analysis of the situation. Differentiate decision making from implementation of the decision. Show the need to group functional response agencies (Fire, Law enforcement, EMS, Public Works, Public Health, Other) and that each group needs a control, a lead person.

Once they can see this, then they will become interested in training to ICS, the national standard for incident management. Until they see the need by walking through incident scenarios, however, ICS trainers are wasting time in frontier America.[9]

6. Marketing CHEMTREC, CHEM-TEL, MSDSs and Information Management in Frontier Areas

Once the participants realize the incident scenario might or will involve technical personnel beyond the local responders' defensive operations level, whether they are hazmat team members, emergency room nurses and doctors, or public health nurses or technicians, local responders will see the need for information above and beyond that which NAERG can provide. That is when the trainer or facilitator shows them in the NAERG how to access CHEMTREC and/or CHEM-TEL to get the MSDSs and the manufacturer data needed to learn the chemical specifics often necessary for technical response. Do not get bogged down here in EPA or OSHA regulations, just use a real MSDS from one of the baseline chemicals, like anhydrous ammonia, chlorine or LPG. Keep up the momentum of the training, don't kill it with regulatory confusion.

This is also a good time, since the subject is data management, to discuss data collection and data management. Show them that all incidents require responders and participants to know certain information in order to handle situations properly: exact location, chemical name, container, amount originally in container, amount released, release rate, weather, temperature, wind, responsible party names and numbers, insurance company names and numbers, etc. The group of participants, from the participating agencies and all affected groups, should develop a jurisdictionally-correct checklist. The NAERG pages 2 and 3 are a good start, but the hazmat team or the clerk and recorder might want different or subsequent information. Put their needs into the system early on.

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[9] Frederick J. Cowie, Ph.D., *A Visioning Approach to Exercise Design in Extremely Rural (Frontier) Areas,* 1997.

7. Getting Past Negativity with Frontier Audiences

As a trainer from Idaho once said, what they say is "Ain't got no LEPC! Don't want no LEPC!" Starting from scratch is the hardest thing to do and nothing succeeds like success. These two truisms may seem contradictory, but they are reality on the frontier and in rural areas. The key to success is targeting. No one can bring all jurisdictions up to speed at the same time. That approach beckons disaster. Target efforts to one local jurisdiction, county or small town, where there is one person in some important role (fire, law enforcement, EMS, public health, public works) who can act as a local catalyst. This person should be willing to dedicate work over the next three to five years, because that is what it takes to develop a local emergency hazardous materials response system. Then commit yourself to make trips to that jurisdiction every month for the next year.

Start with two or three awareness courses (using the principles outlined above). Then do a series of successive tabletop exercises, the first one being an orientation, working through the need for a management system (as outlined above). At that first orientation meeting, use a simple oral or one-page hazard analysis system, where the locals decide what are most likely, most locally interesting, most locally important scenarios.[10] Plan to do three or four tabletops, making them sequentially more complex. Never make them more deadly or more complex or more intense than needed to give the local responders **practice** (that's what exercises should be in rural areas, practices, not tests) doing what they are currently equipped and trained to do. Do not go overboard, don't kill everyone, don't plan to fail!

The evolution of frontier exercises has led to the development of a two-hour exercise where four-to-six different scenarios, using baseline chemicals and relevant local data, are given to local teams, consecutively, one every twenty minutes. For each incident, the local teams then must develop incident strategies as well as operational management plans for the functional areas of fire, law enforcement, EMS, public health and public works, as well as plan to interface with the fixed facility or the transporter. This forces the team to think quickly, as a team, and shows them that things that used to take the hours in early exercises where the team was in formational stages, can now be done in a matter of minutes, with an increasing level of professionalism, confidence and competency. Use of this exercise is recommended before moving outside.

8. Moving the Whole Thing Outside: The Field Exercise

Do not have a field exercise until two successive tabletops, using different scenarios, have proven that the local incident management system works. In the rural and frontier areas of America, very few responders will be at the Operations Level II, perhaps half will be at Awareness Level I. Some will have no training whatsoever. Regardless, there will be a dilemma. *The local field personnel will be wanting "hands on" because that's what they are trained to do. That is what they want to do and that is why they volunteered to do all that work in the first place.* It is critical that everyone at all levels of government understands this. The responders, the real field people, want to go outside and play. *On the other hand, the reality is that response should be according to EPA, OSHA and the NAERG. The Incident Commander, the Operations Chief and the Controls/Leads for fire, law enforcement, EMS, public works and public health should understand and should be implementing an NAERG-based response plan that is essentially "hands-off" and "minds-on!"*

No one should be allowed to "play" until a management systems is in place that is based on training, equipment, exercising and planning which in turn are to be based on federal regulations and guidelines. No one should be allowed to go to the field, even to do defensive "hands-on," until the management (IC and Ops Chief, plus Operational Functional Controls/Leads) are sure that everyone in Operations, including all field personnel and mutual aid folks, realize that all "hands'-on" must be in compliance with standards and with the "minds-on" management plan developed in the tabletop exercises. Everyone must realize that field exercises in frontier areas are almost universally defensive exercises. All necessary training should have been accomplished and exercised before a field exercise is undertaken, regardless how much chomping at the bit goes on.

9. Federal Agencies, Regulations and National Standards: Their Roles in Frontier Areas

So far the plan has been to sell safety, planning, exercises and hard work using the principles of commons sense, personal and familial safety and community service. It must be remembered that frontier folks are non-governmental types, volunteers, people who do other things for a living at the rate of 60-80 hours a week. The only way to get them "in compliance" is to work them into it slowly. Sow them the personal win-win, the community win-win, the volunteer-organization win-win, then build on that. It is best not to mention federal regulations early on, for maybe the first six meetings, or six months or a year. Build the trust, build the confidence, build the team, show them how they have been "in compliance" (explain it as "progressive activities toward compliance," which will in fact be the case if one follows the course outlined above), and how they can now accelerate that process. Give them the necessary basics, at a level comparable to the frontier need!

[10] See hazard analysis form in Fred Cowie, *Developing Realistic LEPCs . . . .*

A. OSHA

Start with OSHA 29 CFR 1910.120 and give them the actual five level training regulations. Show them how what they have been doing complies with the regulations. Of course, a trainer could introduce these concepts, briefly and simply, early on in the Awareness Level I training, but do not waste a community confidence-and-awareness-building opportunity, such as an Awareness course, by trying to explain federal regulations. They might throw the Awareness out with the bath water, as it were.

Explain OSHA as the employee safety and health people. Employees here being considered as paid or volunteer, thus incorporating volunteer fire fighters and volunteer ambulance personnel. This is also a good time to address the "hazard communication" concept, the MSDSs system and why and how that system works. It is very helpful later on for them to know this. It is not necessary for them to understand hazard communication in order to obtain an MSDS from CHEMTREC for an ER doctor during an incident. It is necessary for them to understand it to help develop and sell a comprehensive planning effort later on.

B. FEMA

FEMA is best marketed as the citizen's friend, the group that puts back up bridges, repairs roads, promotes and manages flood insurance programs. If OSHA looks after the responders, FEMA looks after the citizens. Emergency managers don't manage flood waters or forest fires or earthquakes, they manage the activities of people.

C. EPA

If the role of OSHA and FEMA are best explained by using the words themselves and not the acronym, then this holds true for EPA as well. The Environmental Protection Agency lets the responders and the citizens know that someone is watching out for the air, soil and water which form the environment in which they exist. Someone is keeping tabs on the hazards at the secondary, environmental level and that somebody is the EPA. Sometimes the EPA acts as OSHA, sometimes it acts in concert with FEMA, but it is basically a regulatory agency designed to keep the environment and its inhabitants healthy.

D. DOT

The U.S. Department of Transportation has a role to play in hazardous materials because the business of America runs on chemicals, manufactured in one place and used in another. The regulations and guidelines are voluminous and well intentioned. What rural and extremely rural responders need to know is for all intents and purposes contained in the NAERG, which in the U.S. is sponsored by DOT.

E. *National Fire Protection Association (NFPA)*

Firefighters have a group, the NFPA, which develops national standards for various things, including competencies regarding hazardous materials response. While they are not federal regulations, they are national standards, against which response and response planning can be measured, both before the fact and after an incident, by lawyers, judges, juries and regulators. Firefighters should be familiar with NFPA.

F. *Emergency Planning and Community Right-to-Know Act (EPCRA) or SARA Title III*

EPCRA or SARA Title III brings together many of the hazardous materials initiatives of OSHA, FEMA, EPA and DOT under one roof and provides for the development of an infrastructure for coordinated hazardous materials risk management. That infrastructure is the local emergency planning committee (LEPC) and state emergency response commission (SERC) system. If there has been a coordinated series of viable local exercises and locals understand the NAERG and MSDSs, as well as standard defensive fire fighting and EMS procedures at hazardous materials incidents, and use a basic form of ICS, then SARA Title III's planning and exercising requirements should make complete sense. But do not try to sell SARA Title III first. Sell safety first and the regulation second or third or fourth, it will have far better results.

G. CERCLA, RCRA, CWA, CAA and so on

Let the specialist in these fields, if there are any locally, deal with the niceties of these laws, do on inflict them upon ranchers, farmers, loggers, miners, small business women and men acting as volunteer ambulance drivers and volunteer fire fighters. If there are no local specialists, negotiate with state personnel to supply needed expertise for these areas during complex incidents.

Sample Recommended Practice: An Alternative Approach to Hazardous Materials Program Management in Rural and Frontier Areas

1. Planning Efforts in Frontier Areas

Plans must be the written version of actual field activities. Until sufficient scenarios have been developed and until sufficient emergency operations procedures have been developed for these incidents and "exercised," then intense planning efforts will produce documents, but not realistic plans. However, once the NAERG has been adopted locally, once the management team concept has been accepted and practiced, once the functional areas under Operations have standard operating procedures for the cooperating agencies, once the response community acts like a team, once industry is taken in as a partner and is not perceived as the enemy, then planning efforts are productive. They help take the team to a higher level, a consistently proactive level, a planning team level. Soon various functional components of the bigger team begin to have their own team spirit. Soon smaller sub-groups, for instance industry and fire, vie to see who can have the most efficient and effective internal operating procedures. Soon the plan is a live organism and not a deadly shelf document.

History has shown several things regarding this approach. One: Awareness courses and sequentially harder tabletops are the best builder of community support for hazardous materials and emergency management planning activities. Two: Once the home fire is started, training, planning and exercising become self-generating and the facilitator can move on to another jurisdiction.

One of the key planning issues facing rural communities, especially those that have developed successful Operations Level II defensive response capabilities, is addressing with the local elected officials their responsibility for providing for Level III and Level IV, hazardous materials technician and specialist support. This aggressive, offensive support is required when the incident needs outstrip the local capabilities. During an incident is no time to address "What do we do when we can do no more?"

Whether the actual answer lies with contracted services of providers on retainer or under contract, or with state or federal or industrial responders, the answer should be in writing. It should be kept current and it should be easily and quickly initiated by the incident commander, without unnecessary delay or need for executive approval. Lack of response capabilities does not eliminate public safety or planning responsibilities on the part of a jurisdiction. This is abundantly clear to regulators, judges and plaintiffs' lawyers.

It is of great concern to rural and frontier hazardous materials risk management personnel that wholesale distribution facilities for anhydrous ammonia and propane, tank farms for flammable liquids, and co-ops with large quantities of pesticides and farm chemicals in or in close proximity to small towns with little or no response capabilities. It must be remembered, that the ability to contract for hazmat response services from a distant urbanized area, with perhaps six or ten hours elapsing before the arrival of the first response truck, does not alleviate the problems caused either by transportation or fixed facility releases in small towns.

2. Training Efforts and Additional Equipment in Frontier Areas

Simultaneous with a higher level of planning efforts comes increased training efforts. The different scenarios have shown responders their weaknesses, their voids, their shortcomings. They see the real personal and professional need for further training. They begin to ask for more training, a higher level of training, more intense training. People want to become functional team leaders, operational leaders, incident commanders. People want more specific training on baseline chemicals: acids, chlorine, anhydrous ammonia. People want new equipment and the training to use it.

Training monies are often the easiest for agencies to come by, through state or federal training grants. Equipment is harder to find, but industrial benefactors can be found and monies saved through training grants can be reallocated to equipment purchases. A process of continuous, incremental improvement leads to increased planning and training activities.

Hazardous materials response efforts in small towns, where no full team will ever be found due to tax base, population base and industrial base problems, have been known to spur on regional efforts. In certain rural areas, similar closely-located communities have attempted to pool personnel and equipment to field regional teams. These teams plan to train together and come together upon the arrival of the different members to the incident site from four or six surrounding communities.

It may take five years of hard work, but it will never happen if the process isn't started now. It will never happen if everyone, or sometimes anyone, says it can never happen. Yet, it can and has happened, but it takes a logical process, geared to rural and frontier cultural and jurisdictional realities.

One of the most logical and most productive ways to obtain training is to approach the local industry representative, such as a anhydrous distributor, a trainmaster or a tank farm operator, and request set-aside training for local responders or for spaces for local responders at local industry training classes. This not only builds teams and trust, it also facilitates response when incoming industry responders are familiar with local governmental or volunteer responders. It is also a great idea to contact state, regional or national CAER® and TRANSCAER® representatives, railroad training car representatives, petroleum industry representatives, the Chlorine Institute, the state Department of Agriculture or Environmental Quality, EPA, DOT, FEMA and other federal agencies or private organizations to learn about upcoming training opportunities, most of which or free or have but a nominal cost.

3. Building on the Baseline

Once the baseline chemicals are accepted as just that, the foundation of local hazardous materials risk management; when the local PPE supply has grown to a level to handle the hazards involved with baseline chemicals; after sufficient scenarios have been exercised to develop a local incident management system with team members familiar with each other and the ICS system; and at the time the local team is just that, a team, then the time has come to go past the baseline, to build on the foundation.

This can be done, well, very and logically. In the developmental exercise or practice situation with their local scenarios, the facilitator encourages and directs the players to design the scenarios which will allow them to **safely and successfully practice** their parts. Once the fire folks have handled chlorine, acids, anhydrous and flammable liquids successfully sufficient times; after EMS has triaged and transported a variety of standard cases; when law enforcement has proven its mettle with crowd control and traffic jams; sanitarians have managed disposal and road crews have diked and barricaded to their hearts content, then it is time to crank up a notch the different factors involved in the scenarios in order to **stress the seasoned responders** (remember, that early on stress is not the key, practice is) and force them to a higher level. How is that done?

Logically and systematically! It must always be kept in mind that given the local tax base, population base, commerce base and industry base, there is an optimum level of response for that given community. Analysis of the local conditions can result in a fairly accurate determination of **current** and **optimum** response levels.[11] Keep in mind, one does not want to intentionally design a scenario to over stress the local capabilities without simultaneously accounting for mutual aid, state, federal or industrial resources to meet the local need.

Given the above, cranking up the scenario is simple. For law enforcement, it is possible to make the incident a crime scene, using either an environmental crime, a terrorist crime or a dumb crime. For fire, the chemicals can be made more toxic, more flammable, and more corrosive. For fire and EMS the injuries can be more life threatening, the extrication more complex, the interface with the chemicals more intense. For public health, spread some steaks around from a frozen food truck, drop some pesticides into surface water, and cause a more serious aquifer-related problem. For public works, have a need for damming and diking, dust remediation, or extensive barricading. Have some cows and horses affected, fishing or hunting seasons impacted or tourist traffic, if you want to see some real action. But never, **never**, do any of this without both the input from and the concurrence of the affected functions and their associated agencies.

The principle of continual small improvements, which works so well in management activities, works well also in scenario design. Even changing the location of an incident, without actually changing the non-location facts of the scenario, changes jurisdictions, lead agencies and the ICS management folks involved in event. Just remember, this is a team-building exercise, a **practice**, a small piece in a long-term process.[12]

4. The Future of Frontier LEPCs and Frontier HazMat

We should be taking our lead from the people, from the responders in the rural and frontier areas, from those affected by our decisions. The lead should not be coming from the regulators or the legislators. The laws, especially SARA Title III, were designed for the populace and the local responders. The laws and the regulators that enforce them should not become the focus of attention. The goal should remain the same, support of local responders and citizens regarding hazardous materials risk management at the local level. Federal agencies should be looking to the towns, not to downtown. They should be using the knowledge and experience of the successful rural and frontier LEPCs to develop initiatives designed to create more successful ones.

It should be remembered that everything depends not upon regulation and enforcement, but upon finding one local person to take the lead and develop the local team over a period of three to five years. It should be acknowledged that few, less than half probably, of all extremely rural counties will ever achieve successful LEPCs. The goal should be an extremely rural, frontier "standard of care," which accepts the U.S. DHHS and U.S. Congress reality-based concept of frontier status. And everyone should accept that someone has to act as the skilled facilitator of the local process.

How can the federal government facilitate this local process? **Think outside of the lines!** Perhaps OSHA could promote something resembling enhanced-operations Level II or focused-technician Level III which would easily allow for in-compliance rural responses to acid or chlorine or other baseline releases in extremely rural areas. Remember, the responses will always occur (without the non-existent frontier hazmat team) and they will most often occur out-of-technical-compliance if the standard, the compliance standard, is not flexed. DOT could allow for equipment purchases for basic, non-extravagant items under training grants. EPA, FEMA and DOT, under training grants, could allow for overtime or replacement-time payments for volunteers (who are losing wages) who are currently donating nights and weekends to all exercises or training. This would do nothing more than make them equal with paid responders. Or perhaps Congress could fund mobile in-state regional response teams for areas (and states) without sufficient tax, population or industry bases.

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[11] See Cowie, *"Beyond Rural . . . ."* concerning response level determination.

[12] See Cowie, "*Visioning . . . .*" for fundamental basics of this process.

Figure 1

Figure 2

Figure 3

Figure 4

Hazardous Materials

Incident Response Training Guidelines

Hazardous Materials Response-Related Standards

Introduction

There are important Occupational Safety and Health Act (OSHA) or Environmental Protection Agency (EPA) regulations that must be followed when responding to an incident involving hazardous materials. These include regulations which prescribe level of protective equipment, selection and use of respirators, training curriculum criteria, or procedures that must be followed during the response, stabilization, and recovery efforts. This section of the *Guidelines* contains an quick reference summary of these regulations.

Regulations and standards are often referred to as standard of care documents. While portions of existing regulations and standards may vary in application by individual State, Tribal, Territory and local policy, it should be remembered that these established procedures and guidelines are federal requirements that are considered by the emergency response profession in general as minimal and essential standards of care. Therefore it is important that employers, training program managers, and instructors be aware of and familiar with the provisions of these standard of care documents.

The following summaries of response related regulations are intended to provide a quick reference guide and overview of the provisions of each regulation. For the details of any regulation or standard covered in this summary it is necessary to review the entire section or document. Do not use this summary for compliance with the regulation, use the official document.

Summaries are provided in this section for the following regulations and standards of care:

-Hazardous Waste Operations and Emergency Response (HAZWOPER) 29 CFR 1910.120
- First Responder Operations Level Offensive Operations: OSHA Quips
- Employee Records 29 CFR 1910.20
- Personal Protective Equipment, including Eye and Face Protection 29 CFR 1910.133, Respiratory Protection 29 CFR 1910.134, Occupational Head Protection 29 CFR 1910.135, and Occupational Foot Protection 29 CFR 1910.136, Hand Protection 29 CFR 1910.138
- Confined Space Operations 29 CFR 1910.146
- Ventilation for Confined Space Operations
- Bloodborne Diseases 29 CFR 1910.1030
- Lockout / Tagout 29 CFR 1910.147
- Right-to-Know and Material Safety Date Sheets (MSDS) 29 CFR 1910.1200
- Joint Commission on Accreditation of Healthcare Organizations
- Process Safety Management of Highly Hazardous Chemicals 29 CFR 1910.119

HAZARDOUS WASTE OPERATIONS and EMERGENCY RESPONSE (HAZWOPER)

29 CFR 1910.120

(Federal register Vol.54 No.42/ Monday March 6, 1989)

This document was published as final rule Monday March 6, 1989 and contains regulations pertaining to worker safety at several types of hazardous waste sites and emergency response operations without regard to the location of the site. The vast majority of public sector employees will be covered under the emergency response portion of the regulations. The purpose of this document is to provide the means to identify, evaluate, and control safety and health hazards, and provide a program for emergency response in hazardous waste operations. Due to the complexity of this material, it is recommended that you consult a safety professional or local OSHA office for further interpretation and application. Because of the breadth and overall importance of this document, two summaries are provided. The first is a summary of the requirements, for the general reader. The second is a summary of the sectional organization of the document, to assist readers wishing to subsequently reference or review specific sections of the regulation.

1. Summary of HAZWOPER Requirements

General Requirements

Written plan shall be made available to anyone on the site, as well as to federal authorities.

- All personnel on the site shall be informed of the hazards.
- Personal protective equipment shall be provided at no cost to the employees.
- A pre-designated representative of the company shall be appointed to become the incident commander. He/she will control the Incident Command System (ICS) in case of emergency.
- A written standard operating procedure (SOP) shall be developed for every purpose.
- A written hazardous communication program shall be implemented based on the information in Hazardous Communication Right-To-Know (RTK) section of this document.
- All excavations during site preparation shall be shored or sloped in a manner that will not allow accidental collapse.
- A post-emergency response plan that involves clean-up, follow-up, and start-up procedures shall be developed.

Written Safety and Health Program

- Organizational Structure
  - -show the specific chain of command
  - -review and update as often as needed to reflect the current status
- Comprehensive Work Plan
  - -address the specific tasks and objectives of the site operation
- Site Specific Safety and Health Plan
  - -shall contain hazardous analysis specific to that site
  - -shall include employee training on all hazards
  - -personal protective equipment to be used

- control measures to be used
- frequency and types of monitoring
- decontamination procedures
- emergency response plan
- confined space entry procedures (see *Confined Space* in this document)
- spill containment plan and procedures shall be outlined
- standard operating procedure (SOP) shall be outlined
- medical surveillance plan requirements shall be outlined and include:
  - a written surveillance program
  - all physical exams of site workers
  - accurate records of medical surveillance
  - hazardous analysis and monitoring
  - on-site record keeping

Training

- All personnel on the site shall be trained in hazardous waste operations before they participate in any activity that could expose them to hazardous substances, safety, or health hazards.
- Only authorized personnel shall be allowed on the site.
- Content of training:
  - names of persons responsible for site safety and health
  - safety, health, and other hazards present on the site
  - use of personal protective equipment
  - safe work practices
  - safe engineering practices
  - medical surveillance requirements
- General site workers, laborers, and supervisors shall have a minimum of 40 hours of off-site instruc tion and three days on-site training under the direct supervision of a trained, experienced supervisor.
- Workers on the site occasionally and workers regularly on site shall receive at least 24 hours of off-site instruction and one day of on-site training by a trained, experienced supervisor.
- Regular workers required to wear respirators shall undergo an additional 16 hours of off-site instruction and two days of on-site training by a trained, experienced supervisor.
- Management and supervisors shall attend at least 40 hours of off-site instruction and three days of field supervised training and an additional 8 hours of specialized training on topics such as personal protective equipment, employee training, spill containment, and monitoring techniques.
- Trainers shall be qualified to instruct employees and have completed a trainer's course and attained certification as a trainer from that course.
- Each certified worker shall undergo an additional 8 hours refresher training course annually.

Record Keeping

- Written programs and documentation:
  - Organizational Structure
  - Work Plan
  - Standard Operating Procedures (SOP's)
  - Medical Surveillance Program
  - Decontamination Program
  - Emergency Response Plan
  - Safety and Health Program
  - Hazardous Communication Program
  - Training Program
  - Post Emergency Response Plan

2. Summary of HAZWOPER by Sections

(a) Scope, application, and definitions *pg 9317*

1. Scope - This section covers the following operations, unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards.
   - (i) Clean-up required by a government
   - (ii) Work at RCRA sites
   - (iii) Voluntary clean-up at sites recognized by a government
   - (iv) Work at treatment, storage, and disposal sites
   - (v) Emergency response operations

2. Application - Defines who regulations apply to
   - (i) All applicable 1910 and 1926 regulations of Title 29 apply to hazardous waste and emergency response
   - (ii) Hazardous substance clean-up operations must comply
   - (iii) Operations at sites listed in 1 (iv)
   - (iv) Emergency response operations which are not listed in 1 (I) through 1 (iv) must only comply with the requirements of paragraph (q)

3. Definitions

Buddy system - groups of 2 or more to provide rapid response to employees in the event of an emergency

Clean-up operation - work removing hazardous substances

Decontamination - removal of hazardous substance to preclude adverse effects

Emergency response or responding to emergencies - response effort from outside the immediate release area or by other designated responders (i.e. mutual aid groups, local fire departments, etc.)

Facility - any building, structure, pipeline, etc.

Hazardous materials response (HAZMAT) team - means an organized group of employees, designated by the employer, who are expected to perform work to handle and control actual or potential leaks or spills of hazardous substances requiring the possible close approach to the substance for the purpose of control or stabilization of the incident. A HAZMAT team may be a separate component of a fire brigade or fire department

Health hazard - a chemical, mixture of chemicals, or a pathogen that acute or chronic exposure may occur

IDLH - immediately dangerous to life or health which may cause irreversible health effects

Oxygen deficiency - atmosphere with less than 19.5% oxygen

(b) Safety and Health Program *pg 9318*

- (1) General - required for hazardous waste operations and contains 7 specific areas of planning
- (2) Organizational structure part of site program - describes lines of authority
- (3) Comprehensive workplan of the site program - addresses logistics and resources
- (4) Site-specific safety and health plan part of program - addresses hazards

(c) Site characteristics and analysis *pg 9319*

- (1) General - evaluation used to identify specific hazards
- (2) Preliminary evaluation - performed prior to entry
- (3) Hazard identification - identify hazards to health by inhalation, absorption, etc.
- (4) Required information - gathered prior to employees entering site
- (5) Personal protective equipment - includes chemical exposure protection and respiratory protection
- (6) Monitoring - using instruments to evaluate health hazards
- (7) Risk identification - once hazard is identified evaluate risks involved
- (8) Employee notification - all known chemicals and hazards must be explained to employees

(d) Site control *pg 9320*

- (1) General - appropriate site control measures shall be taken
- (2) Site control program - program to protect employees must be developed

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(3) Elements of a site control program - items such as site map, buddy system. etc.

(e) **Training** (this does not apply to emergency responders) *pg 9320*

(1) General - all employees, supervisors, etc. working on site shall be trained

(2) Elements to be covered - names, hazards, PPE, work practices, engineering controls, and medical surveil lance

(3) Initial training

- General site workers must receive 40 hours training off site and a minimum of 3 days field experience .
-Workers on site occasionally - must receive 24 hours training off site and 1 day field experience
-Workers on site in areas where exposures are under permissible limits - must receive 24 hours training off site and 1 day field experience
- Workers with 24 hours of training who may become general site workers must receive 16 additional hours of training and 2 days of field experience

(4) Management supervisor training - on-site management who supervise employees engaged in hazardous waste operations shall receive 40 hours of training and 3 days field experience

(5) Qualifications of trainers - satisfactorily completed training and be an instructor

(6) Training certification - a certificate shall be issued upon completion of training

(7) Emergency response - Those who may respond at a hazardous waste clean-up site and may expose them selves to hazardous substances shall be trained

(8) Refresher training - requires annual refresher training

(9) Equivalent training -documentation of employee's work experience/training

(f) **Medical surveillance** (Pertains to Haz Mat Teams) *pg 9321*

(1) General - Covers hazardous waste/clean up workers and paragraph (q)(9) members of a hazmat team and hazardous materials specialist

(2) Employees covered - Includes employees who are exposed to hazardous substances or health hazards at or above the permissible levels, those who wear a respirator for 30 days or more a year, all employees injured due to over exposure from an emergency involving a hazardous substance, and members of a hazmat team

(3) Frequency of medical examinations and consultations/ includes hazmat teams - prior to assignment, every 12 months unless physician states longer (no longer than biennially), at termination of employment or reassignment, as soon as possible upon notification that employee has developed signs or symp toms indicating possible over exposure to hazardous substance or health hazards, or that employee was injured or exposed above the permissible exposure limits/levels or at more frequent times if physician determines necessary.

(4) Content of medical examinations and consultations - Work or job related items

(5) Examination by a physician and cost - licensed physician at no cost to employee

(6) Information provided to physician - employer shall provide appropriate job related information, a copy of 29 CFR 1910.120, description of PPE the employee will use, and information from previous medical examinations

(7) Physicians written opinion - Shall provide information to employer and employee regarding findings of exam and tests

(8) Record keeping - Records of medical surveillance examinations, physicians opinions, medical complaints, and other information

(g) **Engineering controls, work practices, and personal protective equipment for employee protection** *pg 9322*

(1) Engineering controls, work practices, and PPE for substances regulated in Subparts G & Z

(2) Engineering controls, work practices, and PPE for substances not regulated in Subparts G & Z

(3) Personal protective equipment - Describes all aspects of PPE

(4) Totally encapsulating chemical protective suits - Describes chemical protective clothing

(5) Personal protective equipment (PPE) program - Need for written program describing all aspects of clothing selection and use

(h) **Monitoring** *pg 9323*

(1) General - Describes general concepts of where and how monitoring is applied

(2) Initial entry - Air monitored upon entry to identify any IDLH or flammable condition

(3) Periodic monitoring - Shall be conducted when the possibility of an IDLH or flammable atmosphere has developed and at other times

(4) Monitoring high-risk employees - After clean-up phase

(i) Informational programs required by employer at certain sites *pg 9323*

(j) Handling drums and containers *pg 9323*

(1) General - Handling, transportation, labeled, and disposal

(2) Opening drums and containers - Procedures for opening containers, protective equipment, safety precautions, and others

(3) Material handling equipment - Selection of proper equipment

(4) Radioactive waste - special precautions for this type material

(5) Shock sensitive wastes - Special precautions for these materials

(6) Laboratory waste protocols - Special precautions for laboratory waste

(7) Sampling drum and container contents - Done in accordance with site safety plan

(8) Shipping and transport - procedures to store and ship these containers

(9) Tank and vault procedures - Procedures similar to drums and containers

(k) Decontamination *pg 9325*

(1) General - Procedures shall be developed and followed

(2) Decontamination procedures - Procedures shall be developed, communicated to staff, and implemented before any employee or equipment may enter site

(3) Location - Done in an area to minimize exposure

(4) Equipment and solvents - Shall be properly disposed of

(5) Personal protective equipment - Shall be decontaminated, cleaned, laundered, maintained or replaced as needed

(6) Unauthorized employees - Shall not remove clothing from change rooms

(7) Commercial laundries or cleaning establishments - shall be informed of potentially harmful effects of exposure

(8) Showers and change rooms - When a shower is needed for decontamination special procedures special procedures are needed and must meet the requirements of 29 CFR 1910.141

(l) Emergency response by employees at uncontrolled hazardous waste sites *pg 9325*

(1) Emergency response plan - Shall be developed and implemented by employer

(2) Elements of the emergency response plan - Describes 11 minimum elements

(3) Procedures for handling emergency incidents - Includes features of site, and seven operational procedures to be followed

(m) Illumination - Provides guidelines for amount of light to be provided *pg 9325*

(n) Sanitation at temporary work place *pg 9325*

(1) Potable water - Such as for drinking

(2) Nonpotable water - Such as for firefighting purposes

(3) Toilet facilities - Describes number and types

(4) Food handling - Shall meet applicable regulations of local jurisdiction

(5) Temporary sleeping quarters - Heated, ventilated, etc.

(6) Washing facilities - In near proximity to work site

(7) Showers and change rooms - Provisions for facilities

(o) New technology programs *pg 9326*

(1) Employer shall develop and implement procedures for new technologies and equipment

(2) New technologies - Such as foam, absorbents, adsorbents, etc. shall be evaluated

(p) Certain operations conducted under RCRA of 1976 *pg 9326*

(1) Safety and health program - Develop and implement written plan

(2) Hazard communication program - Must meet 29 CFR 1910.1200

(3) Medical surveillance program

(4) Decontamination program
(5) New technology program
(6) Materials handling program
(7) Training program
(8) Emergency response program

(q) Emergency response to hazardous substance releases *pg 9328*

This paragraph covers employers whose employees are engaged in emergency response no matter where it occurs

(1) Emergency response plan - Shall be developed in writing and implemented to handle anticipated emergencies
(2) Elements of an emergency response plan - As a minimum the plan shall address 11 elements which range from pre-emergency plans to equipment
(3) Procedures for handling emergency response - Includes 10 operational procedures including the need for an incident commander and site safety officer
(4) Skilled support personnel - Includes operational procedures for personnel (not necessarily the employer's own) for such functions as equipment operators of cranes, or earth moving
(5) Specialist employees - Include employee who as part of their job have with special knowledge, skill or ability which includes training an competency demonstration
(6) Training - Includes five levels of response training

Note: Employer should read the job descriptions of these five levels to determine which best describes the type or level of activity their employees will participate in. This will determine the level of the employers emergency response plan and level of training required. See pg 9329

(i) First responder awareness - no set hour requirement, has 6 competency skill areas
(ii) First responder operations - Shall receive a minimum of 8 hours of training which include the 6 competency areas of First Responder Awareness as well as the 6 competencies specifically for this level
(iii) Hazardous materials technician - Shall receive 24 hours of training in 9 competency areas plus those required in items (ii) and (iii).
(iv) Hazardous materials specialist - Shall be trained to the level of technician in addition to 9 additional competencies.
(v) On scene incident commander - Assumes command of an incident beyond the awareness level, has 24 hours of training equal to the first responder operations level plus 6 additional compe tencies

(7) Trainers - Shall have completed a training course for the subjects they are expected to teach along with instructional experience
(8) Refresher training - Those employees trained under (q)(6) shall receive annual refresher training or demon strate competencies
(9) Medical surveillance - Members of a HAZMAT team and hazardous materials specialist shall receive a baseline physical exam (see paragraph (f)) and any emergency response personnel who exhibits signs or symptoms associated with a hazardous materials exposure shall be provided with medical consultation (see paragraph f (3)(ii)
(10) Chemical protective clothing - Clothing and equipment by HAZMAT team members shall meet requirements of (g)(3) - (g)(5)
(11) Post-emergency response operations - Upon completion of emergency response specific conditions for removal of contaminated material and clean-up must be followed

Appendix A - Personal protective equipment test methods *pg 9330*

A. Totally-encapsulating chemical protective suit pressure test procedures
B. Totally-encapsulating chemical protective suit qualitative test procedures

Appendix B - General description and discussion of the levels of protection and protective gear *pg 9332*

Part A - Personal protective equipment is divided into four categories based on the degree of protection afforded (levels A,B,C,D)
Part B - Types of hazards for which levels A,B,C,D protection are appropriate

Appendix C - Compliance guidelines *pg 9333*

1. Occupational safety and health program is discussed
2. Training (emergency response pg 9334, middle column, second paragraph)
3. Decontamination procedures are outlined
4. Emergency response plans (Hazardous Materials Emergency Response Planning Guide - NRT 1 is helpful)
5. Personal protective equipment programs is reviewed
6. Incident command system (ICS) is discussed
7. Site safety and control plans are important to the incident commander

Appendix D - References *pg 9335*

Amendments to original document of March 6, 1989
(Federal Register Vol. 59 No. 161/ Monday August 23, 1994

Appendix B - Last two paragraphs were revised which describes chemical protective clothing
Appendix E - Training curriculum guidelines *pg 43270*

It is noted that the legal requirements are set forth in the regulatory text of 1910.120. The guidance set forth here represents a highly effective program that in the areas covered would meet or exceed the regulatory requirements. In addition, other approaches could meet the regulatory requirements.

Suggested core criteria: *pg 43270*

1. Training facility - Sufficient resources to conduct training
2. Training director - Person in charge
3. Instructors - Criteria for staff including instructional review procedures
4. Course materials - Reviewed and approved by training director
5. Students - Includes screening procedures
6. Ratios - Recommends student-instructor ratio
7. Proficiency assessment - Includes testing procedures
8. Course certificate - Written documentation of completion of course
9. Record keeping - Describes record keeping procedures
10. Program quality control - Annual audit of program quality

Suggested program quality control criteria: *pg 43271*

A. Training plan - Is it adequate and appropriate
B. Program management, training, director, staff, consultants - Is the program adequate and are staff effective
C. Training facilities and resources - Is it adequate and appropriate
D. Quality control and evaluation - Quality control and evaluation plans
E. Students - Adequate procedure for accepting students
F. Institutional environment and administrative support - Enough help
G. Summary/evaluation questions - Overall program evaluation procedures

Suggested training curriculum: *pg 43272*

A. General hazardous waste operations and site-specific training
   1. Off-site training - Hazardous waste operations
   2. Refresher training - Criteria for annual refresher
   3. On-site training - Specific site training/information
B. RCRA Operations training for treatment, storage, and disposal (note: See appendix for additional information about TSD operations)
   1. Minimum training requirements
   2. Provide training prior to entering site

C. Emergency response training - 1910.120 (q) - may be appropriate for public sector emergency response personnel

a. General considerations - May require interaction between emergency responder and site operators

(1) First responder awareness
(2) First Responder operations
(3) Hazardous materials technician
(4) Hazardous materials specialist
(5) Incident commander

First Responder Operations Level Offensive Operations: OSHA Quips

First Responders that are trained in emergency response under the Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation 29 CFR 1910.120q are generally trained to the First Responder Awareness and First Responder Operations levels, but are not generally trained to the Technician level. As a result, First Responders are limited to engaging in only defensive operations and are legally prevented from approaching the release to plug, patch or otherwise stop the release.

For decades first responders such as firefighters and public works personnel routinely plugged leaks in containers such as automobile fuel tanks, truck saddle tanks, and leaks in residential natural gas lines. However, the HAZWOPER regulation precluded first responders from continuing to perform these tasks.

To facilitate the ability to engage in this type of offensive work many agencies have written standard operating procedures (SOP) that provide guidelines for conducting these procedures. They submit the SOP to the Occupational Safety and Health Administration (OSHA) that has jurisdiction and, in most cases, find that OSHA will approve the SOP. Once the SOP is approved by OSHA, the actions are considered acceptable by operations level personnel as long as the scope of the SOP is not violated.

For jurisdictions that desire to have their operations level personnel engage in offensive operations they need to:

A. Develop a separate Standard Operating Procedure for each offensive operation, such as plugging vehicle fuel tank leaks, plugging saddle tank leaks, plugging natural gas line leaks. The content of each SOP should be, at a minimum:

1. The title of the SOP
2. The scope of the SOP
3. The PPE required for conducting the offensive operation.
4. The actual procedure to be followed when engaging in the offensive operation
5. The training required prior to allowing personnel to engage in the offensive operation, with emphasis on the proper PPE and NOT exceeding the scope of the SOP

B. Submit the SOP to your OSHA representative for approval

C. Following approval of the SOP by your OSHA representative, train your personnel as defined in the SOP

D. Don't allow your trained personnel, in actual field operations, to exceed the scope as defined in the SOP

By addressing these simple steps, the capabilities of your first responder operations level personnel can be greatly enhanced and your dependence on Technician level personnel will be reduced for these routine type of incidents.

OSHA Quips

The following question/answer (Quips) interpretations of OSHA 1910.120 have been issued related to the subject of Operations Level offensive operations.

Operations Level Firefighters.
29 CFR 1910.120(q)(6)(ii)

May an emergency responder trained only at the operations level under paragraph (q)(6)(ii) of the standard perform aggressive or offensive actions at an emergency involving a small spill or leak of gasoline without the employer being in violation of the Standard? Typical actions would include plugging or patching a leaking automobile gas tank.

Operations level training by itself is designed to enable emergency responders to safely perform defensive action at a safe distance from the point of release; personnel who have not been trained beyond the operations level are not considered adequately trained to take aggressive action at the point of release and are not permitted to do so. Such action would be in violation of 29 CFR 1910.120(q)(6)(iii), which defines the training requirements for personnel designated to take aggressive action (i.e., hazmat techs).

However, "a small spill or leak of gasoline" would not necessarily constitute an emergency or potential emergency covered under the HAZWOPER standard. Firefighters with or without operations level training may be permitted to handle non-emergency releases of an identified hazardous substance which they are adequately trained and equipped to control. Where an emergency or potential emergency release has occurred, personnel who have not been trained beyond the operations level may perform defensive action, only, deferring aggressive action to more highly trained personnel.

De Minimis Training Policy for Firefighters.
29 CFR 1910.120(q)(6)(iii)

29 CFR 1910.120 is a performance based regulation, providing some flexibility to the employer in meeting the requirements of the regulation. With regard to training, paragraph (q)(6) states " training shall be based on the duties and function to be performed by each responder;" all employees must be adequately trained to perform their assigned job duties without danger to themselves or others.

Hazardous materials technician (hazmat tech) training is necessary for emergency responders who take aggressive action in a potentially dangerous area to stop the release. OSHA may, in appropriate circumstances, consider violations of hazmat tech training to be "de minimis," however, when they do not impact on the ability of responders to safely perform their assigned job duties. The burden would be on the employer to demonstrate to OSHA that the violation did not pose a hazard to the safety or health of employees and that the violation was in fact de minimis in nature.

Therefore, in certain limited circumstances, personnel who do not meet all of the training requirements for the hazmat tech level, but who have training beyond the first responder operations level, would be considered by OSHA to be adequately trained to perform a specific task not otherwise permitted for operations level personnel.

The September 20, 1991 letter addressed to Ron Runge to which you refer was intended to apply only to firefighters. OSHA considers properly trained firefighters to already have extensive training and experience in handling gasoline or other fuel incidents by nature of their regular job duties. However, where the identity of the hazardous substance involved in an uncontrolled release cannot be determined, or where the hazardous substance is one for which firefighters have not received specific training or do not have adequate control equipment, aggressive action should be deferred to a fully trained HAZMAT team. Further, response by a fully trained HAZMAT team may be necessary whenever there are factors which may complicate response efforts.

Consideration for the de minimis policy for 29 CFR 1910.120(q)(6)(iii) is generally limited to small scale emergency involving limited quantities of a known hazardous substance which firefighters are adequately trained and equipped to handle.

Roles and Duties, Hazard Assessment, and Firefighters.
29 CFR 1910.120(q)(2)(ii) and (q)(6)(iii)

You can that the HAZMAT team in one of your urban counties has adopted the policy that gasoline spills of 25 gallons or less do not require response by a HAZMAT team, and can be safely handled by firefighters with "operations plus" training.

OSHA has no authority to determine how State and local authorities divide responsibilities between their fire departments and HAZMAT teams, and express no view on that issue. However, if fire department members with inadequate HAZWOPER training tool aggressive action to respond to a hazardous substance emergency, a violation of 29 CFR 1910.120(q)(6)(iii) would exist; this would not be the case is the fully trained and equipped HAZMAT team were to respond. OSHA does acknowledge that in many cases firefighters may have the capabilities to safely respond to spills where fewer than 25 gallons of gasoline are involved without full hazmat tech training provided they have extensive training in the safe handling of gasoline.

However, the hazard assessment of which incidents can be safely handled by responders without full hazmat tech training cannot be based on quantity alone. Ambient conditions and specific hazards at the scene must be included in the hazard assessment. Which incidents can be safely handled by responders who do not meet all of the competencies required for hazmat tech level would depend also on the extent and content of the additional training beyond the operations level which they had received.

Employers must establish in their written emergency response plan, required in paragraph (q)(2)(ii), guidelines for determining in which scenarios aggressive action should be deferred to the fully trained HAZMAT team. Personnel who will be expected to take aggressive action, but who have not been assigned the full duties of the hazmat tech level, should as part of their training be instructed in these guidelines to enable them to determine which scenarios are beyond their ability to handle safely.

Firefighters Responding to Propane and Gasoline Fires.
29 CFR 1910.120(q)(6)(ii) and (iii)

Firefighters trained to the operations level, who are also trained in the hazards of propane, may enter the danger area to shut off the valves that will starve the fire and thus extinguish it. Normally, employees trained to the operations level would be restricted from taking aggressive action. This is considered to be a special case. The principle hazards from propane are fire and explosion, not toxicity. Because propane fires are common, most firefighters are fully trained and equipped to respond to propane fires, including taking aggressive action by shutting off the valves in the danger area.

If firefighters are fully trained and equipped (which is a high degree of training), and have also received first responder operations level training, OSHA believes they have sufficient training to take aggressive action due to propane's relatively low toxicity.

It would be only a technical violation of 29 CFR 1910.120(q)(6) for not having the additional training required of a HAZMAT technician if a firefighter took aggressive action in the danger area during a propane fire of leak, was fully trained and equipped to handle the fire and had first responder operations level training. In this circumstance OSHA would not issue a citation.

Releases of gasoline similar to the example involving propane discussed above may be addressed by

operations level emergency responders if they have the required PPE, emergency response equipment, and specific training in the safety and health hazards associated with gasoline.

Employers who expect firefighters to shut off a gasoline valve in the danger area, and who can show that employees are trained to the operations level and adequately trained in the hazards of gasoline, have committed a technical violation of 1910.120 (q)(6)(iii) for such employees not having the training required of a HAZMAT technician.

NOTE: The fire and explosion hazards of propane and gasoline are very substantial. The interpretations herein are applicable only when firefighters are fully trained and equipped to handle the explosion and fire hazards of propane, gasoline, or similar gases and liquids.

Firefighters Taking Aggressive Action and Technical Violations
29 CFR 1910.120(q)(6)(iii)

It would be only a technical violation of 29 CFR 1910.120(q)(6) for not having the additional training required of a HAZMAT technician if a firefighter took aggressive action in the danger area during a propane fire or leak, was fully trained and equipped to handle the fire and had first responder operations level training. In this circumstance OSHA would not issue a citation.

If an injury occurred during an emergency response involving these responders (operations level plus additional training) the CSHO would need to consider whether the responders' training and experience were sufficient for the tasks being performed.

A violation of training requirements that resulted in an actual injury to an employee during an emergency response by definition cannot be a "technical violation." Thus, if an injury occurred and the CSHO determined that the responders' training and experience were not sufficient for the tasks being performed, then a citation should be issued noting a violation of 29 CFR 1910.120(q)(6)(iii) and carrying a penalty that requires abatement. Whether abatement should require full training in all of the competencies of the HAZMAT technician level, or whether certain training requirements could safely be omitted, would depend on the training needed to safely perform the tasks in question.

If, however, the CSHO determined that the training which had been provided to the employees in question had been provided to the employees in question had been adequate, then the training violation would be considered a de minimis violation and no citation would be issued for inadequate training. In this situation the CSHO might determine that the cause of the injury was due to a violation of some other requirement of 29 CFR 1910.120 or other standards, for which a citation carrying a fine and requiring abatement would be appropriate.

EMPLOYEE RECORDS

29 CFR 1910.20

The purpose of this section is to give general guidelines concerning the retention of and employee access to medical and exposure records. It is always advisable to make copies rather than loan out documents. If the request for documents is of a serious nature, seek legal counsel.

Current employees, former employees, employees being transferred to a new location, and their representatives have the right to review and receive a copy of any record mentioned below which is *relevant to that employee*.

Medical Records

- Audio Testing
- Chest X-Ray *(These must be available for review, but they do not have to be loaned or copied)*
- Descriptions of Treatments
- Employee Medical Complaints
- First Aid Log
- Post-Employment Physical
- Pre-Employment Physical
- Previous Employment Medical Tests
- Respiratory Fit Testing *(A test to determine which size respirator to wear and to test its fit)*

Exposure Records

- Air monitoring records
- Copy of 29 CFR 1910.20, access to employee exposure and medical records
- Employee medical access training records *(The documentation that informs employees of their right to access exposure and medical records)*
- Measures for controlling worker exposure to chemicals *(Personal protective equipment, ventilation, material handling procedures, etc.)*
- Methodologies used to gather data *(Types of monitoring devices used, procedures, areas included, and substances monitored such as vapors, fumes, gases, or dusts)*
- Noise monitoring records
- Records by the Assistant Secretary of Labor for Occupied Safety and Health
- Record of OSHA 200 Log *(A list of occupational injuries, illnesses, and deaths suffered by employees, which is required by OSHA for all companies employing 10 or more employees)*

Records Not Required to be Released

- Drug testing results
- Health insurance claims *(If it is kept in a file other than the employee's medical file, you do not have to release this information)*
- Medical records prepared for litigation
- Records by the Assistant Secretary of Labor for Occupational Safety and Health
- Voluntary Employee Assistance Programs (EAP) *(Drug and alcohol programs, family/personal counseling)*

Employee Records OSHA 1910.120

Employee Requirements to Obtain Medical Records

Employee and representatives may obtain medical records according to the following conditions:

- The request is in writing and contains the following:
  - company name
  - date authorization will expire, if applicable
  - date of request
  - description of medical information requested
  - employee name
  - employee representative name, if applicable
  - employee signature
  - purpose for request

- If authorization is revoked, it shall be in writing.

Employer Rights and Responsibilities

- The employer can only require employee to answer questions that aid in location of information. *(i.e., dates, locations where employee worked during time in question)*
- Employer shall not charge for the first copy or any additional information at another time.
- Employer may charge a reasonable price for a second copy of the same information received earlier.
- If a copy machine is not available, the documents may be loaned for a reasonable time to have copies made. *(It is best to have office personnel make a copy to avoid the possibility of loss.)*
- Medical records shall be kept on file for 30 years after an employee's termination.
- Names and identifiers of other employees shall be deleted.
- The information requested shall be released within 15 working days. If this is not possible, an explanation must be given to employee and a date of expected compliance.
- X-rays may be loaned at employer discretion, but viewing in house is sufficient and preferred.

Training

Employees first entering work shall be informed annually of the following:

- the existence, location, type of records, and person to contact to retrieve information
- the procedure for accessing records in writing
- their right to access medical records

Transfer or Disposal of Medical Records

- If a business is sold, the successor shall maintain the previous owner's records.
- If a business is closing, current employees shall be notified at least three (3) months prior to closing that they have a right to receive their records.
- OSHA shall be notified three months in advance of closing that you intend to dispose of medical and exposure records.

Record Keeping

Employers shall retain the following records for duration of employment plus 30 years:

- Analysis using Exposure Records
- Exposure Records
- Material Safety Data Sheets
- Medical Records
  (Time begins after employee termination)

PERSONAL PROTECTIVE EQUIPMENT

The purpose of this section is to outline general requirements for respirators, eye, head, foot, and fall protection. Personal protective equipment (PPE) is not always the best method for controlling hazards. However, it can be the fastest and most economical method of protecting employees from known hazards.

29 CFR 1910.132 General Requirements

(a) Protective equipment shall be provided, used, and maintained to protect employees

(b) Where employees provide their own protective equipment, employer must assure its adequacy

(c) All personal protective equipment must be of safe design and construction

(d) Hazard Assesment and Equipment Selection
- (1) Employer shall assess the workplace to determine if hazards are present, or are likely to be, which necessitate PPE
- (2) if so, employer shall: select and require use of appropriate PPE; communicate selection decisions to employees; select PPE that
- (3) Written certification of hazard assessment required

(e) Defective or damaged personal protective equipment shall not be used

(f) Employers shall provide training to all employers required to use PPE
- (1) PPE training must cover: when PPE is necessary; what PPE is necessary; how to don, doff, adjust and wear PPE; limitations of PPE; proper care, maintenance, useful life and disposal
- (2) Employees must demonstrate an understanding of training topics and ability to use PPE
- (3) Retraining may be required
- (4) Written certification of training required

29 CFR 1910.133 Eye and face protection

(a) General provisions
- (1) Protective eye and face equipment shall be required when there is a reasonable probability of injury than can be prevented by such equipment.
- (2) Protectors shall meet minimum requirements for fit, durability, etc.
- (3) Persons with corrective lenses in spectacles - Specifies special equipment
- (4) Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer.
- (5) Employer must ensure that each affected employee uses equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation.

(b) Criteria for devices
- (1) Purchased after July 5, 1994 shall comply with ANSI Z87.1-1989, “American National Standard Practice for Occupational and Educational Eye and Face Protection,”.
- (2) Purchased before July 5, 1994 shall comply with the ANSI “USA standard for Occupational and Educational Eye and Face Protection,” Z87.1-1968.

Personal Protective Equipment

29 CFR 1910.134 Respiratory protection

(a) Permissible practice
- (1) Use of equipment to prevent breathing contaminated air
- (2) Respirators provided by employer when equipment is necessary
- (3) Employee shall use device in accordance with training and instructions

(b) Requirements for a minimal acceptable program
- (1) Written standard operating procedures
- (2) Respirators selected on basis of hazard
- (3) User shall receive training in proper use
- (4) Removed
- (5) Regular cleaning of unit
- (6) Storage of unit
- (7) Inspected routinely - at least once a month and after use
- (8) Appropriate surveillance or work area and degree of exposure or stress shall be maintained
- (9) Regular inspection and evaluation to determine effectiveness of program
- (10) Persons shall not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what health and physical conditions are pertinent. The respirators user's medical status should be reviewed periodically (for instance annually)
- (11) Approved or accepted respirators shall be used

(c) Selection of respirators
- (1) Proper selection according to American National Standard Practices for Respiratory Protection Z88.2-1969

(d) Air quality
- (1) Grade D breathing air
- (2) Breathing air may be supplied by cylinders or compressor
- (3) Air line couplings shall be appropriate
- (4) Breathing air containers shall be marked accordingly

(e) Use of respirators
- (1) Standard procedures shall be developed for use
- (2) Correct respirator shall be specified for each job
- (3) Written procedures shall be prepared covering safe use in dangerous atmospheres
- (4) Frequent random inspections of equipment
- (5) Proper instruction shall be provided to wearer

(f) Maintenance and care of respirators
- (1) Program for maintenance and care shall be established
- (2) Inspection procedures
- (3) Routinely used respirators shall be collected and cleaned as frequently as necessary to insure proper protection to the wearer
- (4) Replacement or repairs shall be done by experienced persons
- (5) Shall be properly stored after inspection and cleaning

(g) Identification of gas mask canisters
- (1) Properly worded labels shall be used to identify units
- (2) Those who issue units shall see that they are properly used and labeled
- (3) Units shall have proper markings
- (4) Special high-efficiency filter for protection against radionuclides shall be properly labeled
- (5) Units may only be used in atmospheres above 16% oxygen level
- (6) Each unit shall be painted a distinctive color

29 CFR 1910.135 Occupational head protection

(a) General provisions
- (1) The employer shall ensure that each affected employee wears a protective helmet when working in areas where there is a potential for injury to the head from falling objects.
- (2) The employer shall ensure that a protective helmet designed to reduce electrical shock hazard is worn by each such affected employee when near exposed electrical conductors which could contact the head.

(b) Criteria for devices
- (1) Protective helmets purchased after July 5, 1994 shall comply with ANSI Z89.1-1986, "American National Standard for Personnel Protection-Protective Headwear for Industrial Workers-Requirements".
- (2) Protective helmets purchased before July 5, 1994 shall comply with the ANSI standard "American National Standard Safety Requirements for Industrial Head Protection," ANSI Z89.1-1969.

29 CFR 1910.136 Occupational foot protection

(a) The employer shall ensure that each affected employee uses protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards.

(b) Criteria for devices
- (1) Protective footwear purchased after July 5, 1994 shall comply with ANSI Z41-1991, "American National Standard for Personal Protection-Protective Footwear".
- (2) Protective footwear purchased before July 5, 1994 shall comply with the ANSI standard "USA Standard for Men's Safety-Toe Footwear," Z41.1-1967

29 CFR 1910.137 Electrical protective devices.

This section outlines the performance criteria for electrical shock protection, in addition to minimal maintenance requirements, for Personal Protective Equipment, where applicable (i.e. gloves).

29 CFR 1910.138 Hand protection

(a) Employers shall select and require employees to use appropriate hand protection when exposed to hazards such as:
- (1) Skin absorption of harmful substances
- (2) Severe cuts and lacerations
- (3) Severe abrasions
- (4) Punctures
- (5) Chemical or thermal burns
- (6) Harmful temperature extremes

(b) Employers shall base selection on an evaluation of performance characteristics of the hand protection relative to:
- (1) Task(s) to be performed
- (2) Conditions present
- (3) Duration of use
- (4) Hazards and potential hazards identified

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Permit-Required Confined Spaces for General Industry

29 CFR 1910.146: Final Rule

(Federal Register Vol. 58 No. 9/ Thursday January 14, 1993)

The purpose of this section is to describe the recommended procedures to be followed with regard to confined spaces in industry. Also, it includes definitions of both permit and non-permit required confined spaces and the regulations that apply to each. Confined spaces are often overlooked in industry, yet they are one of the leading causes of death in today's industrial environment.

(a) Scope and application *pg 4549*

This regulation contains requirements for practices and procedures to protect employees in general industry from the hazards of entry into permit-required confined spaces. This section does not apply to agriculture, to construction, or shipyard employment.

(b) Definitions *pg 4549*

- "Acceptable entry conditions" - Conditions that must exist to allow entry
- "Attendant" - Individual stationed outside who monitors authorized entrants
- "Authorized entrant" - Employee authorized to enter a permit space
- "Blanking or binding" - Absolute closure of a pipe, line, duct, etc.
- "Confined space" - Large enough to enter, limited or restricted egress and entry, is not designed for employee occupancy
- "Double block and bleed" - Closure of line, pipe, duct, etc. and opening drain
- "Emergency" - event that may endanger occupants
- "Engulfment" - Material surrounding victim that can be aspirated and cause death by strangulation, constriction, or crushing
- "Entry" - Pass through an opening into permit-required space
- "Entry permit" - Written document provided by employer to allow and control entry
- "Entry supervisor" - Person such as foreman, crew chief, etc.
- "Hazardous atmosphere" - Atmosphere that may expose employees to risk of death, incapacitation, impairment of ability to self-rescue, or injury from causes such as:
  - Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit
  - Airborne combustible dust at a concentration that meets or exceeds its lower flammable limits
  - Atmospheric oxygen concentration below 19.5 percent or above 23.5
  - Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published
  - Any atmospheric condition that is immediately dangerous to life or health
- "Hot work permit" - A permit for welding, cutting, etc.
- "Immediately dangerous to life and health" - Any condition that poses an immediate or delayed threat to life
- "Inerting" - Means the displacement of the atmosphere with a noncombustible gas
- "Isolation" - Completely removed and protected against the release of energy
- "Oxygen deficient atmosphere" - Oxygen level below 19.5 percent
- "Permit required space" - Space that contains a hazardous atmosphere, material that has the potential for engulfment, or has internal configuration that may trap an individual such as inwardly converging walls
- "Prohibited condition" - Any condition in a permit space not allowed during an entry
- "Rescue service" - The personnel designated to rescue employees from permit spaces
- "Retrieval system" - Equipment to lift persons from a permit space
- "Testing" - Process by which hazards are identified and evaluated

Permit-Required Confined Spaces

(c) General requirements *pg 4551*

(1) The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces.
(2) If permit area is determined, the employer shall inform exposed employees.
(3) If the employer deems there will be no entry, take measures to prohibit entry.
(4) If the employer deems entry is appropriate, develop written plan.
(5) An employer may use specified alternate procedures to enter area.
(6) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.
(7) A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under specific procedures.
(8) When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall inform the contractor of permit spaces, apprise the contractor of the elements, that make it a permit space,apprise the contractor of any precautions, coordinate entry operations with contractor and debrief contractor.
(9) In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall obtain available information about permit space hazards, coordinate entry operations, and inform host employer of permit space program contractor will follow.

(**d) Permit space program**

(1) Implement the measures necessary to prevent unauthorized entry.
(2) Identify and evaluate the hazards of permit spaces before employees enter them.
(3) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations.
(4) Provide the following equipment at no cost to employees, maintain that equipment properly, and ensure that employees use that equipment properly.
(5) Evaluate permit space conditions using specified procedures when entry operations are conducted.
(6) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations.
(7) If multiple spaces are to be monitored by a single attendant, include procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces.
(8) Designate the persons who are to have active roles in entry operations, identify the duties of each such employee, and provide each such employee with the appropriate training.
(9) Develop and implement procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue.
(10) Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this section.
(11) Develop and implement procedures to coordinate entry operations when employees of more than one employer are working simultaneously as authorized entrants in a permit space.
(12) Develop and implement procedures necessary for concluding the entry after entry operations have been completed.
(13) Review and revise entry operations when the employer has reason to believe that the measures taken under the permit space program may not protect employees.
(14) Review the permit space program, using the canceled permits within 1 year after each entry and revise the program as necessary, to ensure that employees participating in entry operations are protected from permit space hazards.

(e) Permit system

(1) Before entry is authorized, the employer shall document the completion of measures by preparing an entry permit.
(2) Before entry begins, entry supervisor identified must sign the entry permit to authorize entry.
(3) The completed permit shall be posted at the entry portal or by any other equally effective means.
(4) The duration of the permit may not exceed the time required to complete the assigned task on the permit.
(5) The entry supervisor shall terminate entry and cancel the entry permit when entry operations have been completed, or a condition that is not allowed arises.
(6) The employer shall retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program

(f) Entry permit

The entry permit that documents compliance with this section and authorizes entry to a permit space shall identify:

(1) The permit space to be entered;
(2) The purpose of the entry;
(3) The date and the authorized duration of the entry permit;
(4) The authorized entrants within the permit space, by name or by such other means as will enable the attendant to determine quickly and accurately, for the duration of the permit;
(5) The personnel, by name, currently serving as attendants;
(6) The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;
(7) The hazards of the permit space to be entered;
(8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;
(9) The acceptable entry conditions;
(10) The results of initial and periodic tests accompanied by the names or initials of the testers and by an indication of when the tests were performed;
(11) The rescue and emergency services that can be summoned and the means for summoning those services;
(12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;
(13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;
(14) Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and
(15) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

(g) Training

(1) The employer shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned..
(2) Training shall be provided to each affected employee before the employee is first assigned, before these is a change in assigned suties, when there is a change in permit space operations and whenever the employer has reason to believe there are deviations for permit entry procedures.
(3) The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary.
(4) The employer shall certify that the training required has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and the authorized representatives.

(h) Duties of authorized entrants

The employer shall ensure that all authorized entrants:

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
(2) Properly use equipment;
(3) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space;
(4) Alert the attendant whenever the entrant recognizes warning sign or symptom of exposure to a dangerous situation, or detects a prohibited condition; and
(5) Exit from the permit space as quickly as possible whenever an order to evacuate is given, the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, the entrant detects a prohibited condition, or an evacuation alarm is activated.

(i) Duties of attendants

The employer shall ensure that each attendant:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
(2) Is aware of possible behavioral effects of hazard exposure in authorized entrants;
(3) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants accurately identifies who is in the permit space;
(4) Remains outside the permit space during entry operations until relieved by another attendant;
(5) Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space;
(6) Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under certain conditions;
(7) Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;
(8) Takes actions when unauthorized persons approach or enter a permit space while entry is underway to warn unauthorized person of hazards, advise unauthorized person to exit, and inform authorized entrants and supervisor if unauthorized persons have entered;
(9) Performs non-entry rescues as specified by the employer's rescue procedure; and
(10) Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

(j) Duties of entry supervisors

The employer shall ensure that each entry supervisor:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
(2) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;
(3) Terminates the entry and cancels the permit;
(4) Verifies that rescue services are available and that the means for summoning them are operable;
(5) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and
(6) Determines, whenever responsibility for a permit space entry operation is transferred, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

(k) Rescue and emergency services

(1) Employer shall ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from permit spaces, perform the assigned duties, practice making rescues at least once every 12 months, trained in basic first aid and CPR.
(2) When an employer (host employer) arranges to have persons other than the host employer's employees perform permit space rescue, the host employer shall inform rescue service of hazards they may confront, and provide rescue service with access to all permit spaces.
(3) To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.
(4) If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

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VENTILATION

Basic Field Application for Confined Space Operations

The purpose of this section is to show when and where ventilation is necessary, as well as the various types of ventilation used.

General Requirements

- Any time an area is known to be contaminated with dust or fumes (toxic or not), a ventilation system shall be installed.
- A respiratory protection program shall be established wherever it is necessary to use respiratory protection equipment. (See *Personal Protective Equipment*)

Examples of hazards to look for in the work area include:

- dust hazards from abrasive blasting
- blast cleaning enclosures
- organic abrasives which are combustible
- areas where particulate fibers are present
- dust hazards in general

Ventilation Requirements

Testing should be done in the ventilation area before any operation takes place in an area where oxygen concentration is less than 19.5% or the Lower Explosive Limit (LEL) is greater than 10%.

Types of Ventilation Systems

- Open air ventilation
- Constant air flow systems

Exhaust Systems

Fans shall be grounded in areas ventilating flammable dusts or fumes. The fan shall be approved for the particular conditions or hazard.

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BLOODBORNE DISEASES

29 CFR 1910.1030

The purpose of this section is to serve as a guide to help protect employees from exposure to blood or infectious materials in the work place. It will help employers and supervisors provide written programs and policies that will help ensure work place safety when there is a possibility of exposure to body fluids. Also, it serves as a training guideline for employees and promotes awareness of bloodborne dangers in the work place.

(a) Scope and Application

This section applies to all occupational exposure to blood or other potentially infectious materials. This section outlines those measures that can be taken to prevent or minimized exposure to bloodborne pathogens through proper planning. It also provides guidelines for the proper cleanup and disposal of those materials, including bodily fluids, that may cause disease.

(b) Definitions

- "Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, or designated representative.
- "Blood" means human blood, human blood components, and products made from human blood.
- "Bloodborne Pathogens" means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).
- "Clinical Laboratory" means a workplace where diagnostic or other screening procedures are performed on blood or other potentially infectious materials.
- "Contaminated" means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.
- "Contaminated Laundry" means laundry which has been soiled with blood or other potentially infectious materials or may contain sharps.
- "Contaminated Sharps" means any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.
- "Decontamination" means the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.
- "Director" means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designated representative.
- "Engineering Controls" means controls (e.g., sharps disposal containers, self-sheathing needles) that isolate or remove the bloodborne pathogens hazard from the workplace.
- "Exposure Incident" means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.
- "Handwashing Facilities" means a facility providing an adequate supply of running potable water, soap and single use towels or hot air drying machines.
- "Licensed Healthcare Professional" is a person whose legally permitted scope of practice allows him or her to independently perform the activities required by paragraph (f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.
- "HBV" means hepatitis B virus.
- "HIV" means human immunodeficiency virus.
- "Occupational Exposure" means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.
- "Other Potentially Infectious Materials" means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

- "Parenteral" means piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.
- "Personal Protective Equipment" is specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.
- "Production Facility" means a facility engaged in industrial-scale, large-volume or high concentration production of HIV or HBV.
- "Regulated Waste" means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.
- "Research Laboratory" means a laboratory producing or using research-laboratory-scale amounts of HIV or HBV. Research laboratories may produce high concentrations of HIV or HBV but not in the volume found in production facilities.
- "Source Individual" means any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, hospital and clinic patients; clients in institutions for the developmentally disabled; trauma victims; clients of drug and alcohol treatment facilities; residents of hospices and nursing homes; human remains; and individuals who donate or sell blood or blood components.
- "Sterilize" means the use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.
- "Universal Precautions" is an approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.
- "Work Practice Controls" means controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

(c) Exposure Control

(1) Each employer having an employee(s) with occupational exposure shall establish a written Exposure Control Plan designed to eliminate or minimize employee exposure, which includes the exposure determination, the schedule and method of implementation of the plan, and the procedure for the evaluation of circumstances. Each employer shall ensure that a copy of the Exposure Control Plan is accessible to employees in accordance with 29 CFR 1910.1020(e) and that the plan will be reviewed and updates at least annually.

(2) Each employer who has an employee(s) with occupational exposure shall prepare an exposure determination. This exposure determination shall be made without regard to the use of personal protective equipment.

(d) Methods of Compliance

(1) Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

(2) Engineering and work practice controls shall be used to eliminate or minimize employee exposure, engineering controls shall be examined and maintained, employers shall provide handwashing facilities which are readily accessible to employees or provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes, and ensure that employees wash their hands any other skin with soap and water immediately.

- Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed.
- Shearing or breaking of contaminated needles is prohibited.
- Immediately or as soon as possible after use, contaminated reusable sharps shall be placed in appropriate containers until properly reprocessed.
- Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure.
- Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.
- All procedures involving blood or other potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets of these substances.
- Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.

- Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.
- Equipment which may become contaminated with blood or other potentially infectious materials shall be examined prior to servicing or shipping and shall be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible.

(3) When there is occupational exposure, the employer shall provide, at no cost to the employee, and ensure employee uses appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices.

(4) Employers shall ensure that the worksite is maintained in a clean and sanitary condition. The employer shall determine and implement an appropriate written schedule for cleaning and method of decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area.

(e) HIV and HBV Research Laboratories and Production Facilities

(1) This paragraph applies to research laboratories and production facilities engaged in the culture, production, concentration, experimentation, and manipulation of HIV and HBV. It does not apply to clinical or diagnostic laboratories engaged solely in the analysis of blood, tissues, or organs. These requirements apply in addition to the other requirements of the standard.

(2) Research laboratories and production facilities shall meet a specified criteria, including but not limited to, incinerating or decontaminating all regulated waste, keeping lab doors closed when working with HIV or HBV, placing all contaminated materials in a durable, leakproof, labeled or color-coded container, limiting to authorized persons, posting hazard warning signs, conducting activities in biological safety cabinets that involve potentially infectious materials, and wearing appropriate protective clothing. Certified biological safety cabinets (Class I, II, or III) or other appropriate combinations of personal protection or physical containment devices shall be used for all activities with other potentially infectious materials.

(3) HIV and HBV research laboratories shall meet the specified criteria, including each laboratory shall contain a facility for hand washing and an eye wash facility which is readily available within the work area, and an autoclave for decontamination of regulated waste shall be available.

(4) HIV and HBV production facilities shall meet the specified criteria, including work areas shall be separated from areas that are open to unrestricted traffic flow within the building, work area shall be water resistant, sink for hand washing shall be provided, access doors shall be self- closing, an autoclave shall be available within or near work area, and a ducted exhaust-air ventilation system shall be provided.

(f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up

(1) The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident and shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are made available and conducted at no cost to the employee by an accredited laboratory, provided at a reasonable time and place, performed by or under the supervision of a licensed physician or under the supervision of another licensed healthcare professional, and provided according to recommendations of the U.S. Public Health Service current at the time these evaluations.

(2) Hepatitis B vaccination shall be made available after the employee has received the training required in and within 10 working days of initial assignment to all employees who have occupational exposure unless the employee has previously received the complete hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons.

(3) Post-exposure Evaluation and Follow-up. Following a report of an exposure incident, the employer shall make immediately available to the exposed employee a confidential medical evaluation and follow-up, including documentation of the route(s) of exposure, and the circumstances under which the exposure incident occurred, identification and documentation of the source individual, unless the employer can establish that identification is infeasible or prohibited by state or local law; collection and testing of blood for HBV and HIV serological status, post-exposure prophylaxis, when medically indicated, counseling, and an evaluation of reported illnesses.

(4) The employer shall ensure that the healthcare professional responsible for the employee's Hepatitis B vaccination is provided a copy of this regulation and ensure that the healthcare professional evaluating an employee after an exposure incident is provided with a copy of this regulation, a description of the exposed employee's duties as they relate to the exposure incident, documentation of the route(s) of exposure and circumstances under which exposure occurred, results of the source individual's blood testing, if available, and all medical records relevant to the appropriate treatment of the employee including vaccination status which are the employer's responsibility to maintain.
(5) The employer shall obtain and provide the employee with a copy of the evaluating healthcare professional's written opinion within 15 days of the completion of the evaluation.
(6) Medical records required by this standard shall be maintained.

(g) Communication of Hazards to Employees

(1) Warning labels shall be affixed to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious material; and other containers used to store, transport or ship blood or other potentially infectious materials. Labels required by this section shall include a legend, shall be fluorescent orange or orange-red or predominantly so, with lettering and symbols in a contrasting color, shall be affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal.
(2) Employers shall ensure that all employees with occupational exposure participate in a training program which must be provided at no cost to the employee and during working hours.

(h) Recordkeeping

(1) The employer shall establish and maintain an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.1020, including employee name and social security number, a copy of the hepatitis B vaccination status, a copy of all results of examinations, medical testing, and follow-up procedures, a copy of the healthcare professionals written opinion, and a copy of information provided to the healthcare professional. The employer shall ensure that employee medical records kept confidential, and not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.
(2) Training records shall include the following information: the dates of the training sessions; the contents or a summary of the training sessions; the names and qualifications of persons conducting the training; and the names and job titles of all persons attending the training sessions. Records shall be maintained for 3 years from the date on which the training occurred.
(3) The employer shall ensure that all records required to be maintained by this section shall be made available upon request to the Assistant Secretary and the Director, employees, to employee representatives, to the Director, and to the Assistant Secretary, and the subject employee for examination and copying.
(4) The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h). If the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director, at least three months prior to their disposal and transmit them to the Director, if required by the Director to do so, within that three month period.

(i) Effective Dates

(1) The standard shall become effective on March 6, 1992.
(2) The Exposure Control Plan shall be completed on or before May 5, 1992.
(3) Information and Training and Recordkeeping shall take effect on or before June 4, 1992.
(4) Engineering and Work Practice Controls, Personal Protective Equipment, Housekeeping, HIV and HBV Research Laboratories and Production Facilities, Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, and Labels and Signs, shall take effect July 6, 1992.

LOCKOUT / TAGOUT
29 CFR 1910.147

(a) Scope, application and purpose

This standard covers the servicing and maintenance of machines and equipment in which the "unexpected" energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy. This standard applies to the control of energy during servicing and/or maintenance of machines and equipment. This section requires employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees.

(b) Definitions applicable to this section

- "Affected employee." An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- "Authorized employee." A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.
- "Capable of being locked out." An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.
- "Energized." Connected to an energy source or containing residual or stored energy.
- "Energy isolating device." A mechanical device that physically prevents the transmission or release or energy, including but not limited to the following: A manually operated electrical circuit breaker, a disconnect switch, a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.
- "Energy source." Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- "Hot tap." A procedure used in the repair maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.
- "Lockout." The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- "Lockout device." A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
- "Normal production operations." The utilization of a machine or equipment to perform its intended production function.

- "Servicing and/or maintenance." Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or un-jamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or start-up of the equipment or release of hazardous energy.
- "Setting up." Any work performed to prepare a machine or equipment to perform its normal production operation.
- "Tagout." The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- "Tagout device." A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

(c) General Requirements

(1) The employer shall establish a program consisting of energy control procedures, employee training and to periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start-up or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

(2) If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph shall utilize a tagout system, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection. After January 2, 1990, whenever replacement or major repair of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designed to accept a lockout device.

(3) When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program and demonstrate full compliance with all tagout-related provisions

(4) Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section. The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance.

(5) Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources. Lockout devices and tagout devices shall be singularly identified; shall be the only device(s) used for controlling energy; shall not be used for other purposes; and shall meet the specific requirements of durability, standardization, substantialness, and identifiability.

(6) The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

(7) The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include authorized employees receiving training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control, affected employees being instructed in the purpose and use of the energy control procedure, employees being instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out, and limitations of tags. The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

(8) Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.
(9) Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

(d) Application of control

The established procedures for the application of energy control (the lockout or tagout procedures) shall cover the following elements and actions and shall be done in the following sequence:

(1) Preparation for shutdown - Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.
(2) Machine or equipment shutdown- The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.
(3) Machine or equipment isolation - All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).
(4) Lockout or tagout device application - (1) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees. (2) Lockout devices, where used, shall be affixed in a manner to that will hold the energy isolating devices in a “safe” or “off” position. (3) Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the “safe” or “off” position is prohibited.
(5) Stored energy - (1) Following the application of logout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe. (2) If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.
(6) Verification of isolation - Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished.

(e) Release from lockout or tagout

Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

(1) The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.
(2) The work area shall be checked to ensure that all employees have been safely positioned or removed. Before and after lockout or tagout devices are removed and before machines or equipment are energized, affected employees shall be notified that the lockout or tagout devices have been removed.
(3) Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer’s energy control program. The employer shall demonstrate that the specific procedure shall include verification by the employer that the authorized employee who applied the device is not at the facility, making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

(f) Additional requirements

(1) In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, in the following sequence of actions: (1) Clear the machine or equipment of tools and materials; (2) Remove employees from the machine or equipment area; (3) Remove the lockout or tagout devices; of this section; (4) Energize and proceed with testing or positioning; (5) Deenergize all systems and reapply energy control measures to continue the servicing and/or maintenance.

(2) Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures and shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

(3) When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

(4) Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.

HAZARD COMMUNICATION STANDARD
WORKER RIGHT-TO-KNOW (RTK)

29 CFR 1910.1200

(a) Purpose

The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

(b) Scope and application

This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency, to laboratories with certain exceptions, and to work operations where employees only handle chemicals in sealed containers.

(c) Definitions

- "Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.
- "Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.
- "Chemical" means any element, chemical compound or mixture of elements and/or compounds.
- "Chemical manufacturer" means an employer with a workplace where chemical(s) are produced for use or distribution.
- "Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.
- "Combustible liquid" means any liquid having a flashpoint at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flashpoints of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
- "Commercial account" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.
- "Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.
- "Compressed gas" means: (i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or (ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) regardless of the pressure at 70 deg. F (21.1 deg.C); or (iii) A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 deg. C) as determined by ASTM D-323-72.
- "Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.
- "Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.
- "Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.
- "Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.
- "Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.
- "Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.
- "Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.
- "Exposure or exposed" means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure.

- "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)
- "Flammable" means a chemical that falls into one of the following categories:
  - (i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;
  - (ii) "Gas, flammable" means: (A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or (B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;
  - (iii) "Liquid, flammable" means any liquid having a flashpoint below 100 deg. F (37.8 deg. C), except any mixture having components with flashpoints of 100 deg. F (37.8 deg. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.
  - (iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.
- "Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows: (i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 deg. F (37.8 deg. C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or (ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 deg. F (37.8 deg. C), or that contain suspended solids, or that have a tendency to form a surface film under test; or (iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)). Organic peroxides, which undergo auto-accelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.
- "Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.
- "Hazardous chemical" means any chemical which is a physical hazard or a health hazard.
- "Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for "physical hazard" and "health hazard" to determine the hazards which must be covered.)
- "Health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.
- "Identity" means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.
- "Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
- "Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.
- "Label" means any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.
- "Material safety data sheet (MSDS)" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.
- "Mixture" means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.
- "Organic peroxide" means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.
- "Oxidizer" means a chemical other than a blasting agent or explosive as defined in 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.
- "Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.
- "Produce" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.
- "Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130 deg. F (54.4 deg. C) or below.

- "Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- "Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.
- "Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.
- "Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.
- "Use" means to package, handle, react, emit, extract, generate as a by-product, or transfer.
- "Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
- "Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.
- "Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

(d) Hazard determination

(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose not to rely on the evaluation performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(2) Chemical manufacturers, importers or employers evaluating chemicals shall identify and consider the available scientific evidence concerning such hazards. For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section.

(3) The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous: (i) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or, (ii) "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.

(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes: (i) National Toxicology Program (NTP), "Annual Report on Carcinogens" (latest edition); (ii) International Agency for Research on Cancer (IARC) "Monographs" (latest editions); or (iii) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

(5) The chemical manufacturer, importer or employer shall determine the hazards of mixing chemicals.

(6) Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate, to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director.

(e) Written hazard communication program

(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified for labels and other forms of warning, material safety data sheets, and employee information and training will be met, including a list of the hazardous chemicals known to be present, and the methods the employer will use to inform employees of the hazards of non-routine tasks and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(2) Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed shall additionally ensure that the hazard communication programs developed and implemented include the methods the employer will use to provide the other employer(s) on-site access to material safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working; the methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and, the methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(3) The employer may rely on an existing hazard communication program to comply with these requirements.

(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

(5) Where employees must travel between workplaces during a workshift, the written hazard communication program may be kept at the primary workplace facility.

(f) Labels and other forms of warning

(1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the identity of the hazardous chemical(s), the appropriate hazard warnings, and the name and address of the chemical manufacturer, importer, or other responsible party.
(2) For solid metal, solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes. The label may be transmitted with the initial shipment itself, or with the material safety data sheet that is to be provided prior to or at the time of the first shipment.
(3) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.
(4) If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard.
(5) The employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information, expect as otherwise provided: (i) Identity of the hazardous chemical(s) contained therein; and, (ii) Appropriate hazard warnings, or alternatively, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.
(6) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information.
(7) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer.
(8) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.
(9) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift.
(10) The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.
(11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within three months of becoming aware of the new information.

(g) Material safety data sheets

(1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet in the workplace for each hazardous chemical which they use.
(2) Each material safety data sheet shall be in English, and shall contain the following information: the identity used on the label, and on trade secrets, physical and chemical characteristics of the hazardous chemical, physical hazards of the hazardous chemical, health hazards of the hazardous chemical, the primary route(s) of entry, the OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available, whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition), any generally applicable precautions for safe handling and use, any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, emergency and first aid procedures, the date of preparation of the material safety data sheet or the last change to it; and, the name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
(3) If no relevant information is found for any given category on the material safety data sheet, the chemical manufacturer, importer or employer preparing the material safety data sheet shall mark it to indicate that no applicable information was found.
(4) Where complex mixtures have similar hazards and contents, the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.
(5) The chemical manufacturer, importer or employer preparing the material safety data sheet shall ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination.
(6) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety data sheet is updated and either provide material safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment.
(7) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a material safety data sheet is updated. The distributor shall either provide material safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment; Wholesale distributors shall also provide material safety data sheets to employers or other distributors upon request.

(8) The employer shall maintain in the workplace copies of the required material safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).
(9) Where employees must travel between workplaces during a workshift, the material safety data sheets may be kept at the primary workplace facility.
(10) Material safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals.
(11) Material safety data sheets shall also be made readily available, upon request, to designated representatives and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.1020(e). The Director shall also be given access to material safety data sheets in the same manner.

(h) Employee information and training

(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets.
(2) Employees shall be informed of: the requirements of this section, any operations in their work area where hazardous chemicals are present, and, the location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.
(3) Employee training shall include: methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area, the physical and health hazards of the chemicals in the work area, the measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, and the details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

(i) Trade secrets

(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical, from the material safety data sheet, provided that the claim that the information withheld is a trade secret can be supported, information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed, the material safety data sheet indicates that the specific chemical identity is being withheld as a trade secret, and, the specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph.
(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement.
(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld, to a health professional providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, under specific conditions.
(4) The confidentiality agreement may restrict the use of the information to the health purposes indicated in the written statement of need, may provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages, and, may not include requirements for the posting of a penalty bond.
(5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.
(6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.
(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must be provided to the health professional, employee, or designated representative, within thirty days of the request, be in writing, include evidence to support the claim that the specific chemical identity is a trade secret, state the specific reasons why the request is being denied, and, explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.
(8) The health professional, employee, or designated representative whose request for information is denied may refer the request and the written denial of the request to OSHA for consideration.
(9) When a health professional, employee, or designated representative refers the denial to OSHA, OSHA shall consider the evidence to determine if: the chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret, the health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information, and, the health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

(10) If OSHA determines that the specific chemical identity requested is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA. If the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations upon the disclosure.

(11) If a citation for a failure to release specific chemical identity information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure.

(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

(j) Effective dates

Chemical manufacturers, importers, distributors, and employers shall be in compliance with all provisions of this section by March 11, 1994.

Joint Commission on Accreditation of Healthcare Organizations

Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is the primary standard setting body for the health care industry. The standards published by JCAHO reflect the work of many advisory groups from private, state and federal sectors, representing the expertise in the delivery of healthcare. The standards are a minimum benchmark for healthcare organizations to achieve in order to become accredited by JCAHO. The cornerstone of this process is *The Comprehensive Accreditation Manual for Hospitals: The Official Handbook (CAMH).* This manual is updated on a quarterly basis to reflect the most current accreditation information and updated standards. The latest version is effective January 1, 1997 with the next update due in May, 1997. The manual is divided into fifteen sections containing 578 individual standards relating to all phases of hospital organization and operations. The sections are:

> Patient Rights and Organizational Ethics (RI Standards)
> Assessment of Patients (PE Standards)
> Care of Patients (TX Standards)
> Education (PF Standards)
> Continuum of Care (CC Standards)
> Improving Organization Performance (PI Standards)
> Leadership (LD Standards)
> Management of the Environment of Care (EC Standards)
> Management of Human Resources (HR Standard)
> Management of Information (IM Standards)
> Surveillance, Prevention and Control of Infection (IC Standards)
> Governance (GO Standards)
> Management (MA Standards)
> Medical Staff (MS Standards)
> Nursing (NR Standards)

In addition to the listed sections, the manual illustrates a detail outline of the accreditation process including the general intent of each standard along with the scoring and aggregation rules for each section.

This process is extremely important to hospitals as JCAHO accreditation is a requirement in most states for hospital licensure, Medicare/Medicaid funding and insurance payments.

The Joint Commission also publishes a manual entitled *Guidelines for the Design and Construction of Hospital and Health Care Facilities*. This document provides guidelines to providers, designers and construction organizations in the building of health care facilities.

For additional information on these publications and/or standards contact:
Joint Commission on Accreditation of Healthcare Organizations
One Renaissance Boulevard
Oakbrook Terrace, IL 60181-9887 Phone: (630) 792-5800

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Process Safety Management of Highly Hazardous Chemicals
29 CFR 1910.119

This section contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. These releases may result in toxic, fire or explosion hazards.

(a) Application

(b) Definitions

- "Atmospheric tank" means a storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (pounds per square inch gauge, 3.45 Kpa).
- "Boiling point" means the boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) (760 mm.). For the purposes of this section, where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, the 10 percent point of a distillation performed in accordance with the Standard Method of Test for Distillation of Petroleum Products, ASTM D-86-62, which is incorporated by reference as specified in Sec. 1910.6, may be used as the boiling point of the liquid.
- "Catastrophic release" means a major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals, that presents serious danger to employees in the workplace.
- "Facility" means the buildings, containers or equipment which contain a process.
- "Highly hazardous chemical" means a substance possessing toxic, reactive, flammable, or explosive properties and specified by paragraph (a)(1) of this section.
- "Hot work" means work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.
- "Normally unoccupied remote facility" means a facility which is operated, maintained or serviced by employees who visit the facility only periodically to check its operation and to perform necessary operating or maintenance tasks. No employees are permanently stationed at the facility. Facilities meeting this definition are not contiguous with, and must be geographically remote from all other buildings, processes or persons.
- "Process" means any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purposes of this definition, any group of vessels which are interconnected and separate vessels which are located such that a highly hazardous chemical could be involved in a potential release shall be considered a single process.
- "Replacement in kind" means a replacement which satisfies the design specification.
- "Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D contained in 1910.1200 sets out the criteria to be used in evaluating trade secrets.

(c) Employee participation

(1) Employers shall develop a written plan of action regarding the implementation of the employee participation required by this paragraph.
(2) Employers shall consult with employees and their representatives on the conduct and development of process hazards analyses and on the development of the other elements of process safety management in this standard.
(3) Employers shall provide to employees and their representatives access to process hazard analyses and to all other information required to be developed under this standard.

(d)(1)(i) through (d)(2)(i)(E) Process safety information. The employer shall complete a compilation of written process safety information to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals.

(d)(2)(ii) Where the original technical information no longer exists, such information may be developed in conjunction with the process hazard analysis in sufficient detail to support the analysis.

(d)(3)(i)(A) through (d)(3)(i)(H) These paragraphs outline the required information regarding the equipment to be used in the applicable processes.

(d)(3)(ii) The employer shall document that equipment complies with recognized and generally accepted good engineering practices.

(d)(3)(iii) For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, the employer shall determine and document that the equipment is designed, maintained, inspected, tested, and operating in a safe manner.

(e)(1) Process hazard analysis shall be completed according to the following schedule:

(i) No less than 25 percent of the initial process hazards analyses shall be completed by May 26, 1994;
(ii) No less than 50 percent of the initial process hazards analyses shall be completed by May 26, 1995;
(iii) No less than 75 percent of the initial process hazards analyses shall be completed by May 26, 1996;
(iv) All initial process hazards analyses shall be completed by May 26, 1997.
(v) Process hazards analyses completed after May 26, 1987 which meet the requirements of this paragraph are acceptable as initial process hazards analyses. These process hazard analyses shall be updated and revalidated, based on their completion date, in accordance with paragraph (e)(6) of this standard.

(e)(2)(i) through (e)(5) These paragraphs outline the choice of methodologies of the hazards analyses, the items that the analyses must address, who should conduct the analyses, and the requirement to establish a system to address, implement and document the findings/recommendations resulting from the analyses.

(e)(6) through (e)(7) At least every five (5) years after the completion of the initial process hazard analysis, the process hazard analysis shall be updated and revalidated. Employers shall retain process hazards analyses and updates or revalidation's for each process covered by this paragraph for the life of the process.

(f)(1)(i)(A) through (f)(1)(iii)(C) These paragraphs cover the requirement to document normal and emergency operating procedures as well as precautions to avoid or minimize physical contact with the process' chemicals.

(f)(1)(iii)(D) & (E) Quality control for raw materials and control of hazardous chemical inventory levels and any special or unique hazards.

(f)(1)(iv) Safety systems and their functions.

(f)(2) Operating procedures shall be readily accessible to employees who work in or maintain a process.

(f)(3) The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice. The employer shall certify annually that these operating procedures are current and accurate.

(f)(4) The employer shall develop and implement safe work practices to provide for the control of hazards during operations. These safe work practices shall apply to employees and contractor employees.

(g)(1)(i) through (g)(3) Outlines the training required of employees and contractors and the documentation required.

(h)(1) through (h)(3)(v) These paragraphs are requirements that apply to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process only.

(i)(1) through (i)(2)(iv) The employer shall perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information. These paragraphs discuss the required elements of the pre-startup safety review.

(j)(1)(i) through (j)(j)(6)(iii) These paragraphs detail the requirements of the employer to assure and document the continued mechanical integrity of the equipment used in covered processes.

(k)(1) through (k)(2) Outline the requirements for Hot Work Permits on covered processes.

(l)(1) through (l)(5) These paragraphs outline the management of changes within the covered processes.

(m)(1) through (m)(7) These paragraphs outline the requirements and procedures for incident investigation. The employer shall investigate each incident which resulted in, or could reasonably have resulted in a catastrophic release of highly hazardous chemical in the workplace. Incident investigation reports shall be retained for five years.

(n) Emergency planning and response. The employer shall establish and implement an emergency action plan for the entire plant in accordance with the provisions of 29 CFR 1910.38(a). In addition, the emergency action plan shall include procedures for handling small releases. Employers covered under this standard may also be subject to the hazardous waste and emergency response provisions contained in 29 CFR 1910.120(a), (p) and (q).

(o)(1) through (o)(5) Compliance Audits must be conducted by the employer at least every 3 years. Employers shall retain the two (2) most recent compliance audit reports.

(p)(1) through (p)(3) ...Trade secrets...Employers shall make all information necessary to comply with the paragraph available to those persons responsible for compiling the process safety information, those assisting in the development of the process hazard analysis, those responsible for developing the operating, and those involved in incident investigations, emergency planning and response and compliance audits without regard to possible trade secret status of such information. Nothing shall preclude the employer from requiring the persons to whom the information is made to enter into confidentiality agreements not to disclose the information. Employees and their designated representatives shall have access to trade secret information contained within the process hazard analysis and other documents required to be developed by this standard.

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Hazmat Guide

Planning Curriculum Guidelines

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Hazardous Materials
Planning Curriculum Guidelines

About the Planning Guidelines

The Planning Curriculum Guidelines are intended to assist public sector training managers and employers to understand the requirements for training public sector personnel involved in planning for hazardous materials emergencies. Existing regulatory requirements are defined, and training recommendations are offered to help public sector training mangers improve the quality and effectiveness of hazardous materials planning.

The Planning Curriculum Guidelines are organized into 14 sections. The first section addresses general planning training issues and includes:

- What is a plan?
- Requirements for hazardous materials planning.
- The planning process.
- The need to train.
- The scope of the planning Curriculum

The second through eleventh sections address training objectives that should be achieved by public sector employees performing various hazardous materials planning functions. The competency areas are:

- Planning Orientation
- Planning Essentials
- Planning Specialties
  - Commodity Flow Study
  - Hazard Analysis
  - Capability Assessment
  - Planning for Protective Actions
  - Plan Implementation and Maintenance
  - Facility Planning
  - Planning for Public Education

The final 3 sections are appendices provided a reference in using the *Guidelines,* and include:

- Appendix A: Planning Guide Summaries
- Appendix B: Planning Models
- Appendix C: National Response Team's Integrated Contingency Plan Guidance

Directions on the use of this material to assess and to support overall planning of training programs are provided in Hazardous Materials Training Program Management at the end of this document.

Hazardous Materials
Planning Curriculum Guidelines:

Planning
Training Issues

What is a Plan?

According to the Federal Emergency Management Agency (FEMA), an emergency operations plan (EOP) is a document that:

- Assigns responsibility to organizations and individuals for carrying out specific actions at projected times and locations in an emergency.
- Sets forth lines of authority and organizational relationships, and shows how all actions will be coordinated.
- Describes how people and property will be protected in emergencies and disasters.
- Identifies personnel, equipment, facilities, supplies, and other resources available for use during response and recovery operations.
- Identifies steps to address mitigation concerns during response and recovery activities.

The fundamental logic that underlies the development of emergency plans is that these and related decisions must be addressed before an incident occurs. During an emergency, no time exists to resolve such issues or to practice and refine roles and responsibilities. The complex analysis and preparation required to establish an effective emergency operations capability must be completed in advance so that public officials and response personnel can act quickly and decisively to control dangerous situations and protect the public.

Given this rationale, an emergency plan must be more than just a document. To be effective, all personnel who will participate in a hazardous materials emergency response must know their roles and responsibilities and be competent in the tasks they will perform. This goal is greatly enhanced by participation of tasked organizations in an integrated planning process, including exercising the plan and periodically revising the plan as needed.

The elements covered in a hazardous materials plan and the approach to planning will vary, depending on the jurisdiction's or facility's unique needs. However, all plans should contain: (1) an analysis of the emergencies likely to occur; (2) an assessment of available resources and existing capabilities; (3) detailed response operations strategies and assignments that address notification, command and control, life safety, and other functional requirements; and (4) identification of prevention measures that can mitigate the seriousness of an emergency or prevent it from occurring. The level of detail captured in the plan will also vary, but must be adequate to allow tasked organizations and individuals to develop comprehensive SOPs in their assigned areas.

Requirements for Hazardous Materials Planning

The responsibility to plan for and, if possible, prevent hazardous materials emergencies is a fundamental extension of the civic responsibility of state and local organizations to ensure the safety of responders and to protect the public. Congress recognizes this government responsibility for emergency management in the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended. Hazardous materials emergency planning is also required under a number of other federal laws and regulations.

The Emergency Planning and Community Right-to-Know Act (EPCRA)
Title III of Superfund Amendments and Reauthorization Act of 1986 (SARA)

EPCRA and Title III of SARA require the formation of state emergency response commissions (SERCs), tribal emergency response commissions (TERCs), emergency planning districts, and local emergency planning committees (LEPCs). Each LEPC must develop, exercise, and maintain an emergency plan that identifies: (1) facilities and transportation routes related to specific chemicals; (2) response procedures of facilities and local emergency and medical personnel; (3) names of community and facility emergency coordinators; (4) procedures for notifying officials and the public in the event of a hazardous material release; (5) methods for detecting a release and identifying areas and populations at risk; and (6) schedules for exercising the emergency plan.

OSHA 29 CFR Part 1910.120
The Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1910.120) require employers involved in hazardous waste operations to develop and implement an emergency response plan for employees. The elements of this plan must include: (1) recognition of emergencies; (2) methods and procedures for alerting employees; (3) evacuation procedures and routes; (4) means and methods for emergency medical treatment; (5) lines of authority; (6) on-site decontamination procedures; (7) site control means; and (8) methods for evaluating the plan.

Resource Conservation and Recovery Act (RCRA)
Under subtitle C of RCRA, the Environmental Protection Agency (EPA) implements standards for the treatment, storage, and disposal of hazardous wastes through permits issued by EPA or an authorized state. Permit requirements include a facility contingency plan, with required opportunities for local government and public comment and input into the plan development.

FEMA Emergency Operations Plan Requirements
Planning requirements for jurisdictions receiving FEMA funds are set forth in 44 CFR Part 302, effective May 12, 1986. This regulation requires states and local governments to prepare emergency operations plan (EOPs) that: (1) identify available personnel, equipment, facilities, supplies, and other resources in the jurisdiction; and (2) describe the method or scheme for coordinating actions taken by individuals and government services in the event of emergencies, including those involving hazardous materials.

Coordination with Federal Response
State and local hazardous materials emergency preparedness should include plans for coordination with and support for federal response to emergencies. The National Contingency Plan (NCP) is coordinated by the National Response Team under section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The NCP provides for federal support to local responders during hazardous materials transportation and fixed facility incidents. The Federal Response Plan (FRP), coordinated by FEMA, describes resources and support for state and local governments during natural and man-made disasters, including major hazardous materials emergencies.

Other Facility Planning Requirements
Facilities that store, handle, or transport certain types and quantities of hazardous materials may be subject to additional federal contingency planning regulations. In this context, the term “facility” is meant to have a wide connotation, and may include, but is not limited to, any mobile or fixed onshore or offshore building, structure, installation, equipment, pipe, or pipeline. A particular facility may be subject to one or more of the following federal regulations:

- EPA’s Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)— 40 CFR part 112.7(d) and 112.20 to 112.21
- MMS’s Facility Response Plan Regulation—30 CFR part 254
- RSPA’s Pipeline Response Plan Regulation—49 CFR part 194
- USCG’s Facility Response Plan Regulation—33 CFR part 154, subpart F
- EPA’s Risk Management Programs Regulation—40 CFR part 68
- OSHA’s Emergency Action Plan Regulation—29 CFR 1910.38(a)
- OSHA’s Process Safety Standard—29 CFR 1910.119
- EPA’s Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, subpart D, 40 CFR part 265, subpart D, and 40 CFR part 279.52

In addition, states and local jurisdictions may mandate regulatory requirements and procedures that must be considered in hazardous materials planning. Local governments and facilities are encouraged to coordinate the development of hazardous materials plans with relevant state and local agencies to ensure compliance with any additional regulatory requirements.

General Training Issues

The Planning Process

There is no single correct way to write a hazardous materials emergency plan. Each entity must plan according to its own situation, based on such factors as geographic size, types of hazards, populations at risk, resources, and level of preparedness. Jurisdictions and facilities should choose the planning elements and processes most appropriate to their circumstances. However, every community and industry needs to evaluate its preparedness for hazardous materials incidents and plan accordingly.

Various explanations of the planning process can be found in the literature, including those described in the *Guide for All-Hazard Emergency Operations Planning* (FEMA SLG 101), *Hazardous Materials Emergency Planning Guide* (NRT-1), *Technical Guidance for Hazards Analysis* (EPA/FEMA/DOT), *Handbook of Chemical Hazard Analysis Procedures* (FEMA/DOT/EPA), and *Emergency Management Guide for Business & Industry* (FEMA 141). These documents and approaches to planning, which are briefly described in Appendices A and B, incorporate the generic functional requirements of planning, although the steps and procedures may be defined somewhat differently. Jurisdictions and facilities should review these and/or other models to select a process that best meets their unique planning needs and preferences.

Whatever model is adopted for the planning process, a team approach is strongly recommended. A planning team is the best mechanism for incorporating the various types of expertise needed in planning, building consensus among organizations and individuals affected by the plan, and promoting professional relationships and understanding among responders. Team members can also help ensure that plans are adequately implemented, evaluated, and maintained after promulgation, and that personnel are given the training and tools they need to achieve competency in their assigned roles and responsibilities.

No specific format is mandated for the results of hazardous materials planning. SLG 101 discusses format options for all-hazard and hazard-specific community plans. NRT's *Integrated Contingency Plan Guidance* (see Appendix C) describes an approved format for consolidating multiple plans that facilities may have to prepare in compliance with various federal regulations. However, a format is "good" if users understand it, are comfortable with it, and can extract the information they need. FEMA recommends that planning teams consider the following design characteristics when deciding upon a format: organization, progression, consistency, adaptability, and compatibility.

The approach taken in these *Guidelines* identifies two fundamental planning products, both of which are derived from a common hazards analysis and capability assessment base: (1) an emergency operations plan that addresses preparedness for, response to, and short-term recovery from hazardous materials incidents; and (2) a prevention/mitigation section of the plan that addresses measures designed to eliminate or reduce the effects of potential emergencies (e.g., land use planning, building codes, inspections, equipment testing, release detection, site security, containment, and fail safe engineering). Note that community development planning, long-term recovery, and organizational administrative planning (financial management, personnel management, record keeping, labor relations, etc.) are outside the intended scope of the *Guidelines*.

The Need to Train

The skill and training of individual responders is only one aspect of safe and effective emergency operations. Hazardous materials incidents are complex and involve the coordinated and timely actions of many different persons, often under stressful conditions. The quality of this coordination—based on clearly defined lines of authority, adequate communication systems, availability of resources when needed, etc.—may play a more important role than individual responder training in minimizing injuries and maximizing control of the emergency.

In hazardous materials emergencies, the importance of pre-response planning cannot be overstated. Plans provide a mechanism for evaluating operational strategies, defining roles and procedures, communicating organizational assignments, and assessing the adequacy of responder training. The integrated team planning process fosters trust and cooperation among individuals and organizations that must work together during an incident. Planning also leads to effective mitigation and prevention measures, thus providing communities and facilities with an opportunity to eliminate or reduce the costly and tragic effects of hazardous materials incidents before they occur.

Effective response and prevention planning depends upon the ability of the people who do the work. The quality of hazard analyses and capability assessments, and the effectiveness of response and prevention plans, is directly related to the competency of the personnel assigned responsibility for performing related tasks—public and private sector officials, agency and program managers, planners, technical experts, and many others.

OSHA's regulation 29 CFR 1910.120(q) requires that all employees be properly trained to perform their roles in response to hazardous materials emergencies. Employers are not now federally required to train personnel involved in planning. However, federal guidelines strongly recommend that all personnel who participate in the hazardous materials planning process at the state and local levels be trained to full competency to perform their roles.

The Scope of the Planning Curriculum

The *Hazardous Materials Planning Curriculum* addresses training needed by persons who have a defined role in the development, implementation, evaluation, and maintenance of hazardous materials emergency plans and standard operating procedures (SOPs). These critical documents must be prepared by state governments, local communities/jurisdictions, community support services organizations (hospitals, schools, mass care, business/industry, etc.), public sector agencies, and private sector facilities that store, use, or transport significant quantities of hazardous materials.

Training requirements for the curriculum span a tremendous variety of functions, skills, and audiences. In the public sector, functional responsibilities include directing and controlling the planning process, collecting data and managing information, identifying hazards, analyzing related vulnerabilities, estimating risk, assessing capabilities, serving as operational experts in writing plans and SOPs, implementing and integrating the results with other planning efforts, designing and evaluating complex exercises, and updating the plan on a regular basis. Individuals performing this work include community officials, SERC and LEPC members, agency and program managers, emergency managers, fire service workers, police, emergency medical services personnel, public works officials, community services and volunteer organization representatives, consultants and technical experts, and many others.

In the private sector, similar roles and functions must be performed. In addition, facilities that meet certain criteria must also conduct technically sophisticated analyses for chemicals they store, handle, or transport; develop production/process safety management plans and employee safety plans; and comply with employee and community right-to-know requirements and other reporting mandates. Potential training audiences include industry owners and executives, business planners, production/process managers, functional managers (e.g., communications, public information, emergency response, etc.), safety officers, technical experts, and others employed by the facility. Local government personnel who have responsibilities for reviewing and approving facility plans and/or enforcing compliance with existing regulations and standards may also benefit by training in this area.

This diversity of audiences and roles presents a special challenge for hazardous materials training management. Access to training audiences is more complex because the interdisciplinary nature of the audience suggests a broad range of possible training delivery mechanisms. Audience members may have limited time available for training in planning since this role is often viewed as an ancillary duty to primary work responsibilities. Finally, hazardous materials training resources may be limited, necessitating an emphasis on response training, with planning and prevention receiving a lower organizational priority.

General Training Issues

Organization of the Planning Curriculum Guidelines

The goal of the *Hazardous Materials Planning Curriculum* is to enhance the knowledge, skills, and attitudes of a broad spectrum of state and local training audiences, thus promoting better hazardous materials planning by jurisdictions and facilities. The curriculum is organized into three training levels based on general skill requirements of the target audience: Planning Orientation, Planning Essentials, and Planning Specialties. These areas are briefly described below; more detailed information on each is presented in subsequent sections of the *Guidelines*.

Planning Orientation

The Planning Orientation curriculum area provides an introduction to hazardous materials planning, with an emphasis on the need for effective plans and the benefits to be derived. Instruction is designed to help individual students identify their roles and responsibilities in the planning process, and motivate them to participate fully and effectively as planning team members. Desired training competencies include an awareness level understanding of general hazardous materials planning concepts, processes, and legal requirements. No prerequisite knowledge of planning and emergency management concepts is assumed, and no skill development is attempted. Training should result in a positive attitudinal change and a general understanding of the planning function.

Planning Essentials

The Planning Essentials curriculum area provides participants with the knowledge and skills they need to develop a basic integrated hazardous materials emergency plan for a jurisdiction or facility. The primary training audience is local planning team members. Training objectives cover a broad range of general competencies, including the ability to function effectively in a team environment, assist in or conduct a basic hazards analysis and capability assessment, work with others to analyze options and draft sections of the plan, and participate in plan implementation, evaluation, and maintenance.

Planning Essentials addresses basic skills, with an emphasis on the student's ability to interpret and use information provided by various technical specialists in developing the plan. More advanced planning skills are covered in the Planning Specialties curriculum area, discussed below. Audience members are assumed to already possess training competencies covered in Planning Orientation and an expertise in the professional discipline that the student represents on the planning committee. Managerial, administrative, and logistic requirements for organizing the planning process, including staff recruitment and assignments, are not addressed.

Planning Specialties

Recognizing that many skills are needed to support the planning process above those involved in basic plan development, the Planning Specialties curriculum area has been organized to articulate additional, often more advanced learning competencies. State and local planning needs and training requirements will vary considerably in these specialty areas. Hence, the curriculum supports selective focused training by jurisdictions and facilities in only those specialty skill areas where training is needed at any given time.

The list of specialty areas included in the curriculum is intended to reflect the prevailing needs of state and local training organizations. It is anticipated that more specialty areas will be defined over time, and some may be eliminated or modified as needs change. Specialty skill training areas identified for the current edition of the *Guidelines* include the following:

- Commodity Flow Study
- Hazards Analysis
- Capability Assessment

- Planning for Protective Actions
- Plan Implementation and Maintenance
- Facility Planning
- Planning for Public Education

Content of the Guidelines

The following sections of the *Guidelines* identify training requirements for each major curriculum area: Planning Orientation, Planning Essentials, and Planning Specialties. These requirements are defined primarily in the form of terminal and enabling objectives that describe basic competencies needed by audience members to successfully perform related tasks. Narrative information describing the curriculum area, target audiences, subject matter content, and recommended training methodologies is included, as appropriate.

The training requirements described in this model support the tasks needed to produce comprehensive OSHA and SARA Title III plans and facility plans. They reflect the general planning philosophies and team approaches incorporated in FEMA and NRT guidance. As noted previously, the training requirements address a variety of audiences and needs. A challenge for state and local training managers will be to match the unique roles and responsibilities of personnel in their jurisdictions with the categories used in this model, or to tailor the model to meet their specific needs. Assistance in this general process will be addressed in the *Guidelines for Training Program Management* section of subsequent editions of this manual.

Hazardous Materials
Planning Training Guidelines

Planning Orientation

General Training Considerations

Introduction

The Planning Orientation curriculum area provides an introduction to hazardous materials planning, with an emphasis on the need for planning and the benefits to be derived. Instruction should to help individual students identify their roles and responsibilities in the planning process, and motivate them to participate fully and effectively as planning team members. Desired training competencies include an awareness level understanding of general hazardous materials planning concepts, processes, and legal requirements. No previous knowledge is assumed, and no skill development should be attempted. Training should result in a positive attitudinal change and the achievement of a general understanding of the planning function.

Audience

The primary training audience for Planning Orientation includes all potential participants in the hazardous materials planning process from jurisdictions, government and response agencies, community services organizations, private sector facilities and transporters, and other businesses and industries. Specifically included are elected and appointed officials, CEOs, program mangers, and others who are able to influence jurisdictional and organizational planning priorities and resources. In addition, training is encouraged for the broad spectrum of persons who have a "stake" in planning, i.e., they may be impacted by the results of planning, although they have no defined role in the actual development of emergency plans. Thus, audience members might include:

- Jurisdiction and facility planning team members
- LEPC and SERC members
- Local and state government officials, including elected and appointed
- Facility owners and managers
- Representatives of government and response agencies, including SOP writers
- Representatives of community support services and volunteer organizations
- Emergency responders and mitigation/prevention personnel
- Citizens in the impacted planning jurisdiction
- Special interest and advocacy groups
- Emergency program managers

Methodology Recommendations

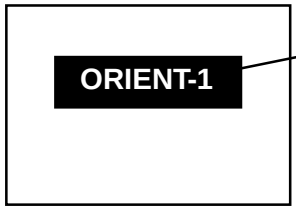
The typical training delivery format for Planning Orientation is a brief (one to four hours) presentation or seminar led by an experienced and dynamic facilitator. Whenever possible, the audience should include representatives from a broad range of organizations and disciplines, thereby promoting a heightened understanding of the diverse interests and requirements associated with hazardous materials planning. Since training should motivate and encourage attitudinal change, the use of presentation graphics and instructional media (slides, videotapes, etc.) is particularly appropriate. Other considerations include:

- Training must be tailored to audience needs, recognizing that some students may have no understanding of emergency management or the challenges associated with interdepartmental planning and coordination.
- When possible, training should permit group interactions and foster initial team building.
- Training experiences should be practical and constructive to promote positive attitudinal change. The discussion of hazardous materials threats, which is important to focus attention and clarify program need, should emphasize positive solutions through community and industrial planning and cooperation.
- Course materials should include local examples and issues to help generate interest and participation in local planning processes.
- Recruitment of students may be an issue due to lack of preexisting interest in the subject. "Teaser" programs and strategies to peak community interest and enrollment may be appropriate.

Recommended Training

Planning Orientation

The following instructional objectives describe student competencies recommended for orienting planning team members and others to the subject of hazardous materials planning. The legislative and regulatory basis for this training can be found primarily in the requirements specified in OSHA 1910.120 for development of employers' emergency response plan, SARA Title III for development of planning jurisdiction emergency response plans, and various federal agency regulations for development of facility and transporter emergency response plans. Sources for the material include the planning guidance in FEMA SLG 101, NRT-1, and other reference documents, the most important of which are described in the Appendices. The objectives are designed to be comprehensive, i.e., to address the training requirements of all identified audience members; thus, training developers and instructors will need to tailor these objectives to meet local audience interests, needs, and planning processes.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as ORIENT-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
ORIENT-1	Given a description of potential hazardous materials risks, explain the purpose and benefits of integrated hazardous materials emergency planning, and describe typical roles and participants in the emergency management system.
ORIENT-1.1	Describe the nature of the hazardous materials threat and associated risks for the government, industry, and community, including the relationship between natural and technological hazards.
ORIENT-1.2	Describe the purpose and benefits of a comprehensive and integrated approach to hazardous materials planning, including the relationships among plans, SOPs, and exercises.
ORIENT-1.3	Describe the roles and general responsibilities of federal, state, and local government agencies and private sector organizations in integrated hazardous materials preparedness, response, recovery, and mitigation/prevention.
ORIENT-2	Given a jurisdiction or facility with the need to develop an integrated hazardous materials plan, identify legal requirements impacting the planning process and product.

Recommended Training

ORIENT-2.1 Identify hazardous materials planning requirements for state and local jurisdictions contained in the following authorities:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended
- Title III of the Superfund Amendments Reauthorization Act (SARA)
- Hazardous Materials Emergency Planning Guide (NRT-1)
- OSHA 29 CFR 1910.120 and EPA 40 CFR

ORIENT-2.2 List legislation and regulations that affect facility planning requirements, including:

- EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)— 40 CFR part 112.7(d) and 112.20 to 112.21
- MMS's Facility Response Plan Regulation—30 CFR part 254
- RSPA's Pipeline Response Plan Regulation—49 CFR part 194
- USCG's Facility Response Plan Regulation—33 CFR part 154, subpart F
- EPA's Risk Management Programs Regulation—40 CFR part 68
- OSHA's Emergency Action Plan Regulation—29 CFR 1910.38(a)
- OSHA's Process Safety Standard—29 CFR 1910.119
- OSHA's HAZWOPER Regulation—29 CFR 1910.120
- EPA's Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, subpart D, 40 CFR part 265, subpart D, and 40 CFR part 279.52

ORIENT-2.3 Describe the characteristics and advantages of all-hazard planning and hazard-specific planning.

ORIENT-3 Given the assignment to conduct hazardous materials emergency planning, identify the scope and elements of an integrated hazardous materials emergency plan.

ORIENT-3.1 Define the scope (in terms of types of emergencies and functions to be addressed) of an integrated hazardous materials emergency plan for a jurisdiction or facility.

ORIENT-3.2 Identify the elements of an integrated hazardous materials emergency plan that are necessary to meet local, state, and federal requirements and guidelines.

ORIENT-4 Given the assignment to conduct hazardous materials emergency planning, identify and describe the major steps, participants, and other resources needed in the planning process.

Note: Various explanations of the planning process can be found in the literature, including those described in the Guide for All-Hazard Emergency Operations Planning (FEMA SLG 101), Hazardous Materials Emergency Planning Guide (NRT-1), Technical Guidance for Hazards Analysis (EPA/FEMA/DOT), Handbook of Chemical Hazard Analysis Procedures (FEMA/DOT/EPA), and Emergency Management Guide for Business & Industry (FEMA 141), and NRT's Integrated Contingency Plan Guidance. These approaches to planning, which are briefly described in Appendix B, incorporate the generic functional requirements of planning, although the steps and procedures may be defined somewhat differently. Jurisdictions and facilities should select and/or modify these models to best meet their unique planning needs and preferences.

ORIENT-4.1 Identify and describe the major steps in the planning process to be used.

ORIENT-4.2	Identify participants and other resources needed for the planning process.
ORIENT-5	Given an assignment to participate in or support integrated hazardous materials planning, develop strategies for promoting planning.
ORIENT-5.1	Describe the participant's role, responsibilities, and work requirements in the integrated hazardous materials planning process.
ORIENT-5.2	Identify related information and training needs, available resources, contacts, and possible obstacles or constraints.
ORIENT-5.3	Develop strategies for promoting planning.

Hazardous Materials
Planning Training Guidelines

Planning Essentials

General Training Considerations

Introduction

The Planning Essentials curriculum provides participants with the knowledge and skills they need to develop a basic integrated hazardous materials emergency plan for a jurisdiction or facility. The primary training audience is local planning team members. Training objectives cover a broad range of generic competencies, including the ability to function effectively in a team environment, assist in or conduct a basic hazards analysis and capability assessment, work with others to analyze options and draft sections of the plan, and participate in plan implementation, evaluation, and maintenance.

Planning Essentials covers basic skills, with an emphasis on the ability to interpret and use information provided by various technical specialists in developing the plan. More advanced planning skills are addressed in Planning Specialties. Audience members are assumed to already possess training competencies covered in Planning Orientation and an expertise in the professional discipline that the student represents on the planning committee. It is further assumed that managerial, administrative, and logistic requirements for organizing the planning process, including staff recruitment and assignments, have already been accomplished. The training competencies for senior management of the overall planning process are addressed separately in this guidance as a planning specialty area.

Audience

The training audience for Planning Essentials includes planning team members who have a defined responsibility in researching, preparing, implementing, and maintaining hazardous materials plans for jurisdictions or facilities. These persons generally represent their organization or functional specialty in an integrated planning process. Audience categories can be summarized as follows:

- For communities, training audiences may include local government emergency planners, SERC/LEPC and Area Committee members, hazardous materials officers and team leaders, emergency program managers, public sector agency representatives, community support services and volunteer organization representatives, and various technical specialists.

- For private sector facilities, audience members may include industry owners and executives, general planners, production/process managers, functional managers (e.g., communications, public information, emergency response, etc.), safety officers, technical experts, and others employed by the facility.

- Personnel who have responsibilities for reviewing and approving facility plans and/or enforcing compliance with existing community regulations and standards may also benefit by training.

Methodology Recommendations

It is recognized that the planning needs of different jurisdictions and facilities, and the resulting training needs of planning team members, can vary greatly, depending on such factors as geographic size, demographics, hazards, local resources, and political preferences. However, Planning Essentials is intended to address the generic training requirements of all hazardous materials planners. Training managers, course developers, and instructors may need to tailor materials to meet the unique needs and interests of different audiences, incorporating elements covered in Planning Specialties, as appropriate.

Training can typically be accomplished in two to four days of classroom instruction led by an experienced facilitator. Breaking training into modules (e.g., Hazards Analysis) that are delivered at different times is also possible, and this approach may be beneficial if timed to coincide with planning team assignments. However, team building is very important in the planning process, so continuity of student groupings throughout training is recommended. Other training considerations include the following:

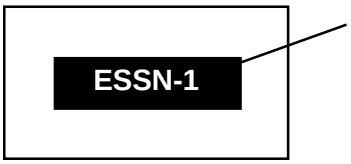
- Training should focus on the actual development of local plans, with the product and participation in the group planning process used to demonstrate student mastery of the objectives.
- Audience should be heterogeneous, reflecting the diverse community members and professional disciplines involved in the planning process. It is highly recommended that team members who will work together in subsequent planning efforts be trained together as a team.
- Course methodology should emphasize group interactions, team building, and resolution of interpersonal conflicts, as well as the development of the plan product itself.
- Course materials should be multi-tracked in terms of type of plan (OSHA, SARA, etc.) to facilitate tailoring the instruction to the needs of the audience.
- Instruction should include practical strategies for merging local plan requirements and needs (i.e. merging several plan requirements into one development effort) to foster more efficient planning efforts.
- Instruction should emphasize the need for on-going planning commitments by the team and the organizations they represent.
- Instruction should emphasize the need for ongoing evaluation at each step in the planning process.
- Instructors should emphasize that steps in the planning process, although taught sequentially, may actually be performed simultaneously.

Recommended Training

Planning Essentials

The following instructional objectives describe competencies recommended for training planning team members and others in the essentials of hazardous materials planning. The legislative and regulatory basis for this training can be found primarily in the requirements specified in OSHA 1910.120 for development of employers' emergency response plan, SARA Title III for development of planning jurisdiction emergency response plans, and various federal agency regulations for the development of facility and transporter emergency response plans. The objectives incorporate generic concepts and processes derived from various sources in the planning literature. Several of the most important reference documents, and more specific models for planning, are described in the Appendices. The objectives are intended to be comprehensive, i.e., to address the training requirements of all identified audience members; thus, training developers and instructors will need to tailor these objectives to meet local audience interests, needs, and planning processes.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as ESSN-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
ESSN-1	Given an assignment as a planning team member and an overview of the planning process to be used, describe an appropriate planning strategy and identify team member responsibilities in the process.

Recommended Training

ESSN-1.1	Describe the benefits of a team approach to planning and identify skills necessary to participate in the team planning process.
ESSN-1.2	Identify team members with related roles, coordination requirements, available resources, and administrative support systems.
ESSN-1.3	Describe roles of participants in the team planning process, to include organizational and/or functional areas of responsibility.
ESSN-1.4	Demonstrate an understanding of the planning process mission statement, goals, and objectives.
ESSN-1.5	Describe the expected results of the planning process, to include the plan format and time lines.
ESSN-2	Given a review of pertinent information sources and data collection methods, demonstrate the ability to identify, acquire and summarize background information related to individual organizational and/or functional area(s) of responsibility that will impact the team planning process.
ESSN-2.1	Demonstrate the ability to identify, gather, and review copies of policies, plans, and authorities (e.g., community Emergency Operations Plans, mitigation/prevention plans, response agency SOPs, facility plans, codes and ordinances, etc.).
ESSN-2.2	Demonstrate the ability to review critiques of actual incidents, exercises, and drills and identify issues to be addressed in the plan.
ESSN-2.3	Demonstrate the ability to review changes and trends impacting the jurisdiction, organization, or facility and identify issues to be addressed in the plan.
ESSN-2.4	Demonstrate the ability to interview managers, public officials, technical specialists, and practitioners in organizations affected by the plan and identify issues to be addressed in the plan.
ESSN-2.5	Identify, aggregate, and summarize related planning issues, priorities, concerns, and challenges.
ESSN-3	Given an assignment as a planning team member and an overview of the planning process to be used, identify and describe the purpose, benefits, major steps, and participant's role in Hazards Analysis & Capability Assessment.

ESSN-3.1	Explain the purpose, benefits, and major steps in conducting a Hazards Analysis.
ESSN-3.2	Explain the purpose, benefits, and major steps in conducting a Capability Assessment.
ESSN-3.3	Identify responsibilities in the Hazards Analysis & Capability Assessment processes, as appropriate.
ESSN-3.4	Describe the methods and expected results of the Hazards Analysis & Capability Assessment processes, including roles of various planning team members and technical specialists.
ESSN-4	Given an assignment as a planning team member and an overview of the planning process to be used, demonstrate the ability to identify, collect, review and interpret the Hazards Analysis & Capability Assessment data.
ESSN-4.1	Demonstrate the ability to collect or assist in collecting the data, as required.
ESSN-4.2	Demonstrate the ability to review and interpret the data.
ESSN-4.3	Demonstrate the ability to identify, map, and prioritize hazards, risk areas, and vulnerable zones, and identify capability shortfalls and excesses (gap analysis).
ESSN-5	Given an assignment as a planning team member and the results of research and input from other planning team members, describe the issues and solutions to be addressed in the plan and identify needed assignments for developing the plan.
ESSN-5.1	Describe issues and solutions to be addressed in the plan by examining existing plans, Hazards Analysis results, Capability Assessment results and other pertinent information.
ESSN-5.2	Identify plan development tasks to be assigned to planning team and other organizational representatives.
ESSN-6	Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating the Integrated Hazardous Materials Emergency Plan, to address preparedness, response and short term recovery.
ESSN-6.1	Identify the planning elements necessary to comply with regulatory requirements, standards, and guidelines.

Recommended Training

ESSN-6.1.1	If developing or updating a jurisdictional plan, describe format guidelines specified in SLG-101 and NRT-1.
ESSN-6.1.2	If developing or updating a facility or organization plan, describe format guidelines specified in the NRT's Integrated Contingency Plan guidance.
ESSN-6.2	Demonstrate the ability to develop or update the plan to meet the required regulatory elements.
ESSN-7	Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating a comprehensive prevention/mitigation section in the plan.
ESSN-7.1	Identify prevention/mitigation strategies and techniques to address the identified issues and solutions.
ESSN-7.2	Demonstrate the ability to write the plan to meet all identified prevention/mitigation planning needs.
ESSN-8	Given a completed draft hazardous materials plan, demonstrate the ability to participate in the plan review and appraisal process.
ESSN-8.1	Identify the purpose and benefits of reviewing the plan.
ESSN-8.2	Demonstrate the ability to conduct an internal draft plan review to assess adequacy and completeness.
ESSN-8.3	Demonstrate the ability to facilitate an external review of the draft plan, which may include peer review, management review, community input, and state/federal review.
ESSN-8.4	Demonstrate the ability to make necessary revisions, and promote formal plan promulgation.
ESSN-9	Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for implementing the plan.
ESSN-9.1	Identify the purpose and benefits of conducting plan implementation.

ESSN-9.2	Identify roles and responsibilities for plan implementation, to include available resources, administrative systems, and time lines.
ESSN-9.3	Describe the strategy and methods for plan implementation, to include: · Disseminating copies of the plan · Briefing and orienting users of the plan · Coordinating the plan with other planning efforts · Coordinating the plan with other training efforts
ESSN-10	Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for evaluating and maintaining the plan.
ESSN-10.1	Identify the purpose and benefits of conducting plan evaluation and maintenance.
ESSN-10.2	Identify roles and responsibilities for plan evaluation and maintenance.
ESSN-10.3	Describe the strategy and methods for plan evaluation and maintenance, to include: · Monitoring changes, trends, and actual events impacting the plan · Developing, conducting, and evaluating exercises and drills · Periodically updating and revising the plan

Hazardous Materials
Planning Curriculum Guidelines:

Planning Specialties Introduction

Introduction

Introduction

Recognizing that many skills are needed to support the planning process beyond those involved in basic plan development, the Planning Specialties curriculum has been organized to articulate additional, often more advanced learning competencies. It is anticipated that state and local planning needs and training requirements will vary considerably in these specialty areas. Hence, the curriculum supports selective focused training by jurisdictions in only those specialty skill areas where training is needed at any given time.

The list of specialty areas included in the curriculum is intended to reflect the prevailing needs of state and local training organizations. It is anticipated that more specialty areas will be defined over time, and some may be eliminated or modified as needs change. Specialty skill training areas identified for the current edition of the *Guidelines* include the following:

- Commodity Flow Study
- Hazards Analysis
- Capability Assessment
- Planning for Protective Actions
- Plan Implementation and Maintenance
- Facility Planning
- Planning for Public Education

Other topics planned or under discussion include Organizing the Planning Process, Planning Information Management, Exercising the Plan, SOP Writing, Illicit Use of Hazardous Materials, Liability Issues in Hazardous Materials, Marketing the Plan, and Public Information/Education Programs. Recommendations or feedback on the selection of topic areas for inclusion in future editions of the *Guidelines* should be directed to William Lewis, Emergency Management Institute, FEMA.

Audience:

The training audience for the Planning Specialties curriculum includes jurisdiction and/or facility hazardous materials planning team members that have been assigned responsibilities requiring advanced level knowledge and skills, i.e., exceeding that needed to develop a basic plan as defined in Planning Essentials. Included are representatives of local government and response agencies, community services organizations, private sector facilities and transporters, and other businesses and industries. Since audience members will vary somewhat according to the topic, they are defined in more detail for each specialty area. However, a generic listing might include:

- Jurisdiction and facility planning team members
- LEPC and SERC members
- Facility owners and managers
- Representatives of government and response agencies
- Representatives of community support services and volunteer organizations
- Mitigation/prevention personnel
- Consultants and technical experts
- Emergency program managers

Methodology Recommendations

The typical training delivery format for Planning Specialties is a one to two day course led by an experienced instructor. However, more or less time may be appropriate, depending on the subject area, degree of complexity, and related planning requirements. Training managers may also wish to combine Planning Specialties modules for audiences that need training in more than one area, or add one or more modules to Planning Essentials. Other training considerations include the following:

- Audience members are assumed to already possess basic competencies in hazardous materials plan development. Otherwise, experience and expertise among audience members may vary significantly.
- Training should be tailored to audience needs, focusing on the specific jurisdiction's or facility's planning requirements and individual assignments in the planning process.
- Course materials should include local examples, and activities should be based on local issues and data to the extent possible.
- Where local teams are conducting complex studies, members should be trained concurrently, and training should permit group interactions and foster team building.

More information on training scope, audiences, and appropriate methodologies is presented on subsequent pages for each specialty topic area.

Hazardous Materials
Planning Curriculum Guidelines:

Commodity Flow Study

General Training Considerations

Scope/Objectives of Training

Most communities, whether large or small, are origins, destinations, or through-routes for hazardous materials transportation. In order to plan and prepare for possible hazardous materials incidents, planners need basic data on the types and quantities of chemicals transported through the jurisdiction. The process of acquiring and analyzing this information, referred to here as a commodity flow study, is one of the first steps in preparing a community's integrated hazardous materials emergency plan. Results can be used to analyze current traffic patterns, focus planning efforts on existing needs, and reduce the potential for incidents to occur.

This training specialty area builds on Planning Essentials competencies to provide participants with the knowledge and skills they need to prepare a simple commodity flow study. Content areas covered by training should include the purpose and benefits of conducting commodity flow studies, an overview of appropriate data collection methods, generic steps in the process, related statistical concepts, and sources of additional assistance and information. Where appropriate, more specific models and procedures followed by the jurisdiction can be introduced. Applications and limitations of the study results in the planning process should also be reviewed.

Audience

Potential training audiences include all participants in the planing process that have been assigned responsibility for conducting a commodity flow study that exceeds the competencies covered under Planning Essentials. Possible audience members include:

- • Community planning team members
- Facility planners and managers
- Response agency representatives
- Prevention personnel, transport inspectors
- Technical experts and consultants

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students are assumed to possess Planning Orientation and Planning Essentials levels of competency in hazards analysis and related skills. Consideration should be given to students that have a defined responsibility for conducting a commodity flow study for a jurisdiction as a regular part of their job.

Typical Program Format

Seminar-type instructor-led program, approximately one to two days in length. Longer programs may be appropriate where more complex commodity flow studies are planned or when actual field surveys are included as training activities.

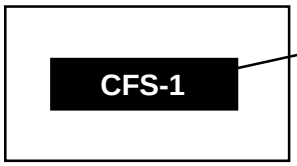
Methodology and Training Delivery Considerations

Training should provide students with knowledge of the steps and components of a generic commodity flow study, and skill in performing various data collection methods. Trainees must understand the significance and application of commodity flow study information, and develop the ability to recognize and develop useful and meaningful data on which to base subsequent emergency operations and prevention programmatic and organizational decisions.

Much of the subject matter in this specialty area can be introduced through self-study, but training should include formal classroom instruction with time spent in individual and small group work. Activities should focus on skill development in identifying, collecting, and interpreting various types of commodity flow data, and in using this information in the planning process. Limited field surveys, reviews of shipping papers, role plays of driver interviews, etc. are particularly appropriate for promoting learning. Realistic local situations and scenarios should be used as the basis for activities, when possible.

Recommended Training

Integration of the information learned by trainees can be demonstrated in a post-class activity involving the development of a limited commodity flow study based on data from the jurisdiction or scenarios provided by the instructor. For this reason, members of jurisdictional planning teams should be trained together, if possible, using the planned study as the basis for activities. Content testing is appropriate for demonstrating knowledge of the steps involved in a commodity flow study and methods of data collection.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as CFS-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
CFS-1	Given a jurisdiction with the need to develop an integrated hazardous materials emergency plan, describe the purpose and benefits of conducting a commodity flow study, including appropriate applications of the results in planning.
CFS-1.1	Describe the purpose and benefits of conducting a commodity flow study in hazardous materials planning.
CFS-1.2	Describe appropriate applications of the results of commodity flow studies in hazardous materials planning.
CFS-2	Given an assignment to conduct a commodity flow study for a jurisdiction, identify major steps in the process, such as the following: (1)Identify the specific purpose(s) of the study. (2)Review baseline information appropriate to the study. (3)Design the study. (4)Conduct field surveys. (5)Analyze the results. (6)Apply the results to the study purpose and objectives.
CFS-3	Given an assignment to conduct a commodity flow study for a jurisdiction, identify the specific purpose(s) of the study.
CFS-3.1	Assess the emergency management needs and other possible applications and uses for hazardous materials transportation data in the jurisdiction.
CFS-3.2	Identify the specific types of hazardous materials transportation data needed for the study.

Recommended Training

CFS-4	Given the specific purpose(s) of a commodity flow study for a jurisdiction, demonstrate the ability to identify and review existing baseline information appropriate to the study.
CFS-4.1	Describe common sources of existing information that can be used to identify roads available to hazardous materials transportation.
CFS-4.2	Describe common sources of existing information on vehicle traffic patterns, chemical flows, and accident histories in the jurisdiction.
CFS-5	Given the specific purpose(s) and baseline data of a commodity flow study for a jurisdiction, demonstrate the ability to design a field investigation appropriate to the study.
CFS-5.1	Compare baseline information with project goals to determine whether a field investigation should be undertaken.
CFS-5.2	Identify options and considerations for determining survey locations.
CFS-5.3	Identify options and considerations for determining survey times and repetitions.
CFS-5.4	Identify the personnel and other resource requirements associated with selected field survey methods.
CFS-6	Given an area to be surveyed and the commodity flow study design for a jurisdiction, demonstrate the ability to implement common data collection methods.
CFS-6.1	Describe common methods and demonstrate the appropriate use of placard surveys.
CFS-6.2	Describe common methods and demonstrate the appropriate use of shipping papers reviews.
CFS-6.3	Describe common methods and demonstrate the appropriate use of driver interviews.
CFS-6.4	Describe common methods and demonstrate the appropriate use of facility surveys.
CFS-6.5	Describe the advantages and disadvantages of various data recording procedures that can be used in field surveys.
CFS-7	Given hazardous materials transportation data for a jurisdiction, demonstrate the ability to apply appropriate sampling techniques to the collection and interpretation of the data.
CFS-7.1	Describe key statistical concepts (e.g., Poisson distribution, expected and observed value, confidence intervals) relevant to traffic flow analysis.
CFS-7.2	Make appropriate conclusions and inferences based on sample characteristics and collected data.

Recommended Training

CFS-8	Given hazardous materials transportation data and analyses for a jurisdiction, demonstrate the ability to apply the results in planning.
CFS-8.1	Map or otherwise display and report the results of the commodity flow study to obtain a clear picture of hazardous materials transportation in the jurisdiction.
CFS-8.2	Compare the study results and project goals to identify action items and a schedule for implementing them through the jurisdiction's plan development and implementation process.

Hazardous Materials
Planning Curriculum Guidelines:

Hazards Analysis

General Training Considerations

Scope/Objectives of Training

A hazards analysis includes (1) identifying hazards associated with the storage, handling, processing and transportation of hazardous materials, (2) conducting a vulnerability analysis to identify people, property, and environments susceptible to damage should a hazardous materials release occur, and (3) conducting a risk analysis to determine the probability of various types of emergencies and estimates of resulting damage.

Training should provide the knowledge and skills necessary to conduct a comprehensive hazards analysis for a jurisdiction or facility. Skill development should include the ability to assess the jurisdiction's or facility's hazards analysis needs, determine appropriate methods, collect and interpret data, and report the results. Specifically included is the use of tables and other tools for determining the level of concern, establishing hazard and vulnerability zones, and identifying related priorities. More sophisticated and technical approaches to hazards analysis may also be covered, if appropriate, or references provided for additional training and assistance.

Audience

Potential training audiences are all participants in the planing process that have been assigned responsibility for conducting a hazards analysis that exceeds the competencies covered under Planning Essentials. Possible audience members include:

- Community planning team members
- Facility planners and managers
- Response agency representatives
- Prevention personnel
- Technical experts and consultants

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students are assumed to possess Planning Orientation and Planning Essentials levels of competency in hazards analysis. Consideration should be given to students that have a defined responsibility for conducting higher level hazards analyses for a jurisdiction or facility as a regular part of their job.

Typical Program Format

Seminar-type instructor-led program, approximately one to two days in length. Longer programs may be appropriate where more complex studies are planned or when actual field surveys are included as training activities. Training managers may wish to combine this instruction with a module on capability assessment for audiences that perform both tasks.

Methodology and Training Delivery Considerations

The successful accomplishment of training objectives should result in enhanced student proficiency in applying the principles of hazards analysis to a specific jurisdiction's or facility's planning needs and processes. Training should focus on developing knowledge of the steps and components of hazards analysis and on developing skill in performing hazard identification, vulnerability analysis, and risk analysis. Trainees must understand the significance and application of hazards analysis information, and develop the ability to recognize and develop useful and meaningful data on which to base subsequent emergency operations planing and prevention programmatic and organizational decisions.

Much of the content for analyzing hazards can be introduced through self-study, but training should include formal classroom instruction with significant time spent in individual and small group work. Activities should focus on skill development in extracting hazard identification and vulnerability information from available data sources, determining vulnerable zones from maps and hazard data, and performing the analyses leading to accurate risk determination. Content testing is appropriate for demonstrating knowl-

edge of the steps involved in hazards analysis, listing types of hazard information, and identifying the components of a completed hazards analysis.

Because of the interdisciplinary nature of planning and hazards analysis, training audiences should be heterogeneous and, whenever possible, small-group work should be conducted to encourage cross-disciplinary interactions. Integration of the information learned by the trainee can be demonstrated in a post-class activity involving the development of a limited hazards analysis using data from the trainee's home jurisdiction or facility, or scenarios provided by the instructor. Members of planning teams that are conducting a complex hazards analysis should be trained together, if possible, with student activities based on assignments.

Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as HAZAN-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
HAZAN-1	Given an assignment to conduct a hazards analysis for a jurisdiction or facility, describe the process to be used for conducting the study.
HAZAN-1.1	Describe the purpose and benefits of conducting a hazards analysis, including appropriate applications of the results in planning.
HAZAN-1.2	Describe the basic steps in a hazards analysis (hazards identification, vulnerability analysis, risk analysis).
HAZAN-1.3	Identify types and sources of information commonly used in hazards analysis.
HAZAN-2	Given an assignment to conduct a hazards analysis for a jurisdiction or facility, demonstrate the ability to identify hazards and situations that pose a serious threat in the planning area.
HAZAN-2.1	Describe the process and data sources to be used for hazards identification.
HAZAN-2.2	Identify the location of hazardous materials facilities and major transportation routes within the planning area.
HAZAN-2.3	Identify the types, quantities, and specific locations of hazardous materials used by facilities within the planning area.

Recommended Training

HAZAN-2.4	Identify the types and quantities of hazardous materials transported in or through the planning area.
HAZAN-2.5	Assess the storage conditions of hazardous materials in the planning area (e.g., containment, packaging, security, release detection).
HAZAN-2.6	Identify the nature of hazards (e.g., flammable, explosive, toxic) most likely to accompany hazardous materials spills or releases.
HAZAN-3	Given the results of the hazard identification, demonstrate the ability to analyze and map the vulnerability of people, property, business interests, and environments in the planning area.
HAZAN-3.1	Describe the process and data sources to be used for vulnerability analysis.
HAZAN-3.2	Identify methods to screen and prioritize hazards for more in-depth analysis.
HAZAN-3.3	Identify the level of concern for chemical hazards.
HAZAN-3.4	Estimate the credible worst-case scenario for hazardous materials threats.
HAZAN-3.5	Determine the extent of vulnerable zones for identified hazards using worst-case scenarios.
HAZAN-3.6	Map vulnerable zones, and identify conditions that influence the zone of impact.
HAZAN-3.7	Identify susceptible human populations, property, business interests, and environments in the vulnerable zone, including high-risk populations, critical facilities, and sensitive environments.
HAZAN-4	Given a hazard identification and vulnerability analysis for a community or facility, demonstrate the ability to assess the risk of injury or damage due to a hazardous materials release in the planning area.
HAZAN-4.1	Describe the process and data sources to be used for risk assessment.
HAZAN-4.2	Estimate the probability of occurrence of worst-case scenarios, and describe unusual conditions, such as the possibility of simultaneous incidents.
HAZAN-4.3	Assess community and facility safeguards, response capabilities in place, and incident histories (as necessary).
HAZAN-4.4	Describe the type of harm to human populations and damage to property, business interests, and environments expected in worst-case situations.
HAZAN-4.5	Categorize, prioritize, and/or rank hazards for planning, as appropriate.

HAZAN-5	Given the hazard identification, vulnerability analysis, and risk assessment for a community or facility, demonstrate the ability to prepare a comprehensive hazard analysis report.
HAZAN-5.1	Identify and describe hazards and related conditions in the planning area.
HAZAN-5.2	Describe the vulnerability of populations, property, business interests, and environments to hazardous materials threats in the planning area.
HAZAN-5.3	Describe the risk of injury and/or damage from hazardous materials incidents in the planning area, and prioritize risks for planning, as appropriate.

Hazardous Materials
Planning Curriculum Guidelines:

Capability Assessment

General Training Considerations

Scope/Objectives of Training

A capability assessment provides information designed to help the planning team evaluate preparedness, prevention, and response resources and capabilities. It includes an assessment of fixed site business and industry resources, transportation resources, and community (response and government agency) resources that could be called upon in the event of a potential emergency identified in the jurisdiction's or facility's hazards analysis.

Training should provide the knowledge and skills necessary to conduct a capability assessment for a jurisdiction or facility. Skill development should include the ability to assess the jurisdiction's or facility's capability assessment needs, determine appropriate methods, collect and interpret data, and report the results. Specifically included is the use of checklists, criteria, surveys, and other methods to identify available resources, determine requirements for accessing them, evaluate deficiencies in existing plans and procedures, and assess the effectiveness of emergency response, prevention, and recovery efforts. The successful accomplishment of training objectives should result in enhanced student proficiency in applying general principles of capability assessment to specific jurisdiction or facility planning needs and processes.

Audience

Potential training audiences include all participants in a jurisdiction or facility planing process that have been assigned responsibility for conducting a capability assessment study. Possible audience members include:

- Community planning team members
- Facility planners and managers
- Response agency representatives
- Prevention personnel
- Technical experts and consultants

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students are assumed to possess Planning Orientation and Planning Essentials levels of competency in capability assessment. Consideration should be given to students that have a defined responsibility for conducting a higher level capability assessment as a regular part of their job for a jurisdiction or facility.

Typical Program Format

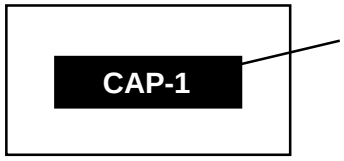
Seminar-type instructor-led program, approximately one to two days in length. Longer programs may be appropriate where more complex studies are planned or when actual field surveys are included as training activities. Training managers may wish to combine this instruction with a module on hazard analysis for audiences that perform both tasks.

Methodology and Training Delivery Considerations

Training should focus on providing knowledge of the steps and components of a comprehensive capability assessment and on developing related skills. Trainees must understand the significance and application of capability assessment information, and develop the ability to recognize and develop useful and meaningful data on which to base subsequent emergency operations planing and prevention programmatic and organizational decisions.

Much of the content for assessing capabilities can be introduced through self-study, but training should include formal classroom instruction with significant time spent in individual and small group work. Activities should focus on skill development in extracting capability assessment information from available data sources, identifying and assessing existing resources, assessing the effectiveness of emergency management activities, and identifying and evaluating planning shortfalls.

Integration of the information learned by the trainee can be demonstrated in a post-class activity involving the development of a limited capability assessment based on the hazards analysis and resource data from the trainee's home jurisdiction or facility, or from scenarios provided by the instructor. Content testing is appropriate for demonstrating knowledge of the steps involved in capability assessment, listing types of community and facility resources, and identifying the components of a completed capability assessment.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as CAP-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
CAP-1	Given an assignment to conduct a capability assessment for a jurisdiction or facility, describe the process to be used for conducting the study.
CAP-1.1	Describe the purpose and benefits of conducting a capability assessment, including appropriate applications of the results in planning.
CAP-1.2	Describe the advantages and disadvantages of alternative methods for conducting the capability assessment (checklists, criteria, surveys, expert panels, etc.).
CAP-1.3	Identify specific types and sources of information needed to conduct the capability assessment.
CAP-2	Given the process to be used for conducting a capability assessment for a jurisdiction or facility, assess the adequacy of existing resources to support preparedness, prevention/mitigation, response, and short-term recovery activities.
CAP-2.1	Determine the type, amount, capabilities, and accessibility of existing facility resources.
CAP-2.2	Determine the type, amount, capabilities, and accessibility of existing transporter resources.
CAP-2.3	Determine the type, amount, capabilities, and accessibility of existing community resources.
CAP-3	Given hazardous materials plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prepare for, respond to, and recover from worst-case incidents identified in the hazard analysis.

Recommended Training

CAP-3.1	Evaluate response issues and concerns identified through surveys and reviews of hazardous materials incident critiques, exercises, and drills.
CAP-3.2	Assess the adequacy of the jurisdiction's or facility's concept of operations, including roles and functional assignments, for responding to and recovering from worst-case incidents.
CAP-3.3	Assess the adequacy of existing resources for implementing the concept of operations in worst-case incidents.
CAP-3.4	Assess the adequacy of organizational policies and SOPs for implementing the concept of operations in worst-case incidents.
CAP-3.5	Assess the level of competency of emergency personnel to respond in worst-case incidents identified in the hazard analysis..
CAP-4	Given hazardous materials plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prevent or mitigate the effects of identified risks.
CAP-4.1	Evaluate prevention issues and concerns identified through surveys or reviews of hazardous materials incident critiques, exercises, and drills.
CAP-4.2	Assess the adequacy of prevention measures, including roles and functional assignments, for preventing or mitigating the effects of identified risks.
CAP-4.3	Assess the adequacy of existing resources for implementing necessary prevention measures.
CAP-4.4	Assess the adequacy of organizational policies and SOPs for implementing necessary prevention measures.
CAP-4.5	Assess the level of competency of prevention personnel to implement necessary prevention measures.
CAP-5	Given the results of the capability assessment analysis, prepare a comprehensive written report.
CAP-5.1	Describe preparedness, mitigation/prevention, response, and short-term recovery capability shortfalls identified in the analysis.
CAP-5.2	Identify additional resources that may be needed to prepare for, prevent/mitigate, respond to, and recover from worst-case hazardous materials incidents.
CAP-5.3	Describe deficiencies in community and/or facility safety plans and procedures identified in the analysis, and recommend modifications, as appropriate. .

Hazardous Materials
Planning Curriculum Guidelines:

Planning for Protective Actions

General Training Considerations

Scope/Objectives of Training:

Planning for protective actions addresses policy and procedures for providing personal protection to the public, including protection in place and evacuation. Considerations include public education, alert and warning systems, the availability of appropriate shelter, the nature and duration of hazardous materials releases, traffic flow and control, reception and care facilities, health and medical services, protection of water and sewage systems, ongoing incident assessment, and other emergency response functions and capabilities.

Training should provide a working knowledge of the benefits and limitations of various protection strategies, including evacuation, in-place protection, and a combination thereof. Participants should gain an understanding of the need for protective action planning and important planning considerations. They should develop the ability to implement a decision-making process for any given hazardous materials emergency situation and protective action option, and learn strategies and techniques for communicating the desired protection action to the general public to elicit the best possible response.

Plans for protective actions must address roles, strategies, and procedures for a broad range of emergency preparedness and response activities. Depending on the jurisdiction's or facility's needs, planning may involve very complex analyses, decisions, and negotiations that must be addressed before incidents occur. Therefore, the goal of training is to give participants the knowledge and skills they need to assess existing capabilities in this area, identify needed resources, and establish systems for promoting effective response in any realistic hazardous materials incident scenario.

Audience:

The training audience includes decision makers, planning team members, SOP writers, and agency and organization representatives with responsibilities related to mass care and protective actions in hazardous materials emergencies. Possible audience members include:

- Community planning team members
- Local Emergency Planning Committees
- Government and response agency representatives
- Facility planners and managers
- Community support services and volunteer group representatives
- Incident Commanders
- Public Information Officers
- Warning Officers
- Emergency Management Officials

Prerequisites or Presumed Knowledge/Skills of Students:

Students should have mastered basic skills in hazardous materials planning, and have assigned responsibilities for hazardous materials emergency planning for a jurisdiction or facility. They should understand basic concepts of the Incident Command System, public relations and education, and emergency information and warning.

Typical Program Format:

An instructor-facilitated one to two day program with lecture/discussion, student and/or tabletop exercises, and case study reviews. Longer programs may be appropriate where more complex studies, student activities, and field work are planned.

Methodology and Training Delivery Considerations:

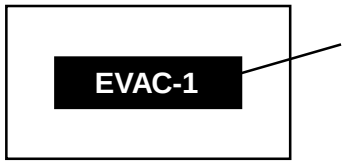
Planning for protective actions requires knowledge and skills in a broad range of disciplines and emergency response functions. Typically, many different government agencies, community organizations, and private sector groups are assigned related responsibilities under the emergency plan. For these reasons, the use of planning teams is particularly suited for this type of planning. Whenever possible, planning teams should be trained together to promote information sharing, inter-organizational understanding, and cooperation. Other considerations include:

- The training competencies identified for this curriculum area assume that a comprehensive hazards analysis and capability assessment have been completed for the jurisdiction or facility. If this assumption is incorrect, training managers may wish to incorporate additional competencies from other planning specialty areas in the instruction.

- Instructional content should stress the interrelationships among planning processes, prepared ness activities, response actions, and the public information and education components of emergency management.

- Training methodologies should emphasize small group interactions among various participants in the planning process. Hazardous materials incident case examples should be incorporated into the course, using student activities or tabletop exercises to promote and evaluate skill/ learning objectives.

- An instructional cadre concept, emphasizing diverse organizational interests and expertise, is particularly appropriate for this type of training.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as EVAC-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
EVAC-1	Given a hazards analysis and capability assessment for a jurisdiction or facility, demonstrate the ability to develop decision-making criteria for implementing protective actions.
EVAC-1.1	Describe the purpose and benefits of various protective action strategies, including evacuation, in-place sheltering, water supply protection, sewage system protection, and relocation.
EVAC-1.2	Compare the advantages and disadvantages of evacuation and in-place protection options for mass care in hazardous materials emergencies.

Recommended Training

EVAC-1.3 Identify factors to consider in selecting a protective action strategy in a hazardous materials emergency situation, including:

- The nature of the threat
- The population at risk
- Time factors involved
- Weather conditions
- Communications
- Response capabilities

EVAC-1.4 Identify and assess resources available for implementing various protective actions, including capabilities of organizations assigned related responsibilities under the plan.

EVAC-1.5 Develop decision-making criteria for implementing protective actions that address evacuation (precautionary, general, and selective), in-place sheltering, and other options in emergency situations identified in the hazards analysis.

EVAC-2 Given the assignment to plan for protective actions for a jurisdiction or facility, demonstrate the ability to assess existing systems, strategies, and procedures for notifying, warning, and informing the public about protective action decisions.

EVAC-2.1 Identify factors that influence the public's understanding of and response to protective actions in hazardous materials emergencies.

EVAC-2.2 Assess existing public education programs for informing the public about protective actions in the event of a hazardous materials emergency, including citizen roles and responsibilities.

EVAC-2.3 Assess existing warning and emergency public notification systems for implementing protective actions in a hazardous materials emergency.

EVAC-3 Given a hazards analysis and capability assessment for a jurisdiction or facility, demonstrate the ability to assess existing systems, strategies, and procedures for evacuating populations at risk in a hazardous material incident.

EVAC-3.1 Identify eight considerations when planning an evacuation, as follows:

(1)Emergency scene access and evacuation routes
(2)Areas of responsibility
(3)Geographical area, size and type
(4)Evacuation area
(5)Weather conditions
(6)Transportation
(7)Resisters
(8)Mass care centers and shelters

EVAC-3.2 Identify four constraints to an effective evacuation, as denoted in the Hans and Sells Study conducted for the U.S. Environmental Protection Agency, as follows:

(1)Time delay
(2)Notification time
(3)Mobilization time
(4)Travel time

EVAC-3.3	Identify six steps for implementing the evacuation process, as follows: (1)Form work groups (2)Track personnel assignments (3)Use map coordinates for making assignments (4)Issue evacuation warnings (5)Identify relocation shelters (6)Use the three-phase notification process
EVAC-3.4	Assess systems, strategies, and procedures for moving people out of risk areas (availability of vehicles, evacuation routes and alternatives, controlling traffic, special populations, etc.)
EVAC-3.5	Assess preparedness for reception and care of evacuees (shelter locations, supplies, notifying family members, health and medical care, mutual aid agreements, etc.)
EVAC-3.6	Assess decision-making criteria and procedures for re-entry after an evacuation.
EVAC-4	Given a hazards analysis and capability assessment for a jurisdiction or facility, demonstrate the ability to assess existing systems, strategies, and procedures for implementing in-place sheltering and other protective actions in a hazardous materials incident.
EVAC-4.1	Assess systems, strategies, and procedures for initiating and implementing in-place protection.
EVAC-4.2	Assess systems, strategies, and procedures for initiating and implementing water supply protection.
EVAC-4.3	Assess systems, strategies, and procedures for initiating and implementing sewage system protection.
EVAC-4.4	Assess systems, strategies, and procedures for monitoring toxic releases, continually assessing the potential for injury and damage, notifying the public as necessary, and terminating response activities.
EVAC-5	Given an assessment of the jurisdiction's or facility's capabilities to implement protective action options in hazardous materials incidents, demonstrate the ability to develop related emergency plans and procedures.
EVAC-5.1	Describe potential problems and capability shortfalls for implementing protective actions in worst-case hazardous materials incidents.
EVAC-5.2	Identify additional resources that may be needed to prepare for and implement protective actions in worst-case hazardous materials incidents.
EVAC-5.3	Identify recommended changes to hazardous materials emergency plans (addressing, for example, sections on the concept of operations, roles and responsibilities, direction and control, warning systems and emergency public notification, resource management, health and medical, personal protection of citizens, ongoing incident assessment, and human services).
EVAC-5.4	Describe modifications to jurisdiction and/or facility policies and procedures that are required to facilitate the recommended plan changes.

Hazardous Materials
Planning Curriculum Guidelines:

Plan Implementation and Maintenance

General Training Considerations

Scope/Objective of Training

Training in this curriculum area will provide students with the knowledge, skills, and practical tools they need to successfully implement a completed hazardous materials response plan, anticipate future outcomes, monitor and evaluate the plan's effectiveness, and revise it as appropriate to improve the jurisdiction's or facility's emergency operations and prevention/mitigation capabilities. Instruction builds on Planning Essentials competencies to help participants develop the feedback loop necessary for long-term plan maintenance and enhancement.

The content of training addresses (1) plan implementation, including promulgation and dissemination of the plan, orientation of plan users, and integration of multi-jurisdictional planning efforts; (2) validation of the plan, including methods of plan review, plan testing, and exercising; and (3) plan maintenance, including development of strategies and processes to identify, illuminate, and correct problems with the plan. Other subject areas potentially include environmental scanning, management audits, performance audits, and other long-term and strategic planning concepts.

Training focuses on the role of the planning manager or administrator in establishing systems and strategies for plan implementation and maintenance. This person may also participate in (and need training in) the actual writing and development of the plan, as defined in Planning Essentials and other Planning Specialties areas. Furthermore, the planning manager or administrator may function as the jurisdiction's or facility's Exercise Manager/Officer. However, advanced competencies in exercise design and development will be covered in a separate Planning Specialty area in subsequent editions of these *Guidelines*.

Audience

The training audience includes all personnel involved in the implementation, validation, and maintenance of a completed hazardous materials plan for their respective jurisdiction or facility. Audience members potentially include planners and decision makers for agencies and organizations represented in the plan, community leaders, and others interested in improving hazardous materials preparedness. Possible audience members are:

- Community planning team members
- Local Emergency Planning Committee members
- Government and response agency representatives
- Facility planners and managers
- Community support services and volunteer group representatives
- Exercise program managers and exercise officers
- Emergency Management Officials

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students should possess Planning Orientation and Planning Essentials competencies and previous experience in community or organizational planning. They should have job responsibilities directly related to the management and administration of hazardous materials plans and planning processes for a jurisdiction or facility.

Typical Program Format

One to two days of classroom instruction with an emphasis on activities designed to help students develop strategies and mechanisms to assess, evaluate, and refine existing hazardous materials plans. Job aids to facilitate later work may be desirable. Training program managers may wish to combine this instruction with more in-depth materials on exercise design and development for audiences that perform both roles.

Methodology and Training Delivery Considerations

- Ideally, training audiences should be heterogeneous, reflecting the wide range of personnel involved in the integrated hazardous materials planning process. If possible, individuals who work together as members of a planning team should be trained together.

- Training methodologies should emphasize small group interactions and practical activities based on actual plans and realistic situations. Since teamwork and continuity are important in plan implementation and maintenance, it is recommended that student groupings be maintained throughout training.

- Generic case studies or scenarios should be available for use with audiences from diverse communities and organizations. The instructor should be able to flexibly tailor, update, or substitute these materials, depending on audience needs.

- Training emphasizes skills and attitudes needed for students to become effective long-term community change agents. Emphasis will be placed on methods and techniques for effecting meaningful change.

Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as PI&M-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
PI&M-1	Given the goals and objectives of the integrated hazardous materials planning process for a jurisdiction or facility, develop a strategy for plan implementation.
PI&M-1.1	List organizations and key personnel who should participate in plan implementation, including: • Planning team members • Organizations, groups, and facilities assigned responsibilities under the plan • Local, state, and federal oversight agencies • Community support services organizations affected by the plan
PI&M-1.2	Establish objectives for plan review and validation as part of the plan development process.
PI&M-2	Given a completed integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure proper promulgation and dissemination of the plan.

Recommended Training

PI&M-2.1	Identify the steps necessary to ensure proper promulgation of the plan.
PI&M-2.2	Determine the information needs of various groups, and develop strategies to orient them to their roles and assignments under the plan.
PI&M-2.3	Develop strategies to orient the public on the plan, including clarifying technical information as necessary to promote public understanding.
PI&M-3	Given an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure coordination with multi-jurisdictional planning efforts.
PI&M-3.1	Identify and assess options for coordinating and integrating the plan within the jurisdiction and/or facility.
PI&M-3.2	Develop strategies to communicate the substance of the plan to other jurisdictions, including surrounding communities, state offices, and federal (national/regional) personnel involved in related planning efforts.
PI&M-3.3	Develop strategies to establish communication links with local, state, and federal organizations to obtain feedback on emergency management program changes that may affect the plan.
PI&M-4	Given an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure that organizations and personnel are capable of carrying out their assigned responsibilities.
PI&M-4.1	Develop strategies to ensure that each organization develops the SOPs necessary to facilitate the accomplishment of assigned tasks under the plan.
PI&M-4.2	Develop strategies to assess related training needs.
PI&M-4.3	Identify training programs and assistance available in the public and private sectors.
PI&M-5	Given implementation of an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies for monitoring changes and trends that impact the plan or planning process.
PI&M-5.1	Identify changes and trends that could impact the plan or planning process, including but not limited to: • Economic • Legal • Political • Technological • Social • Demographic
PI&M-5.2	Identify strategies for collecting and assessing information from reviews or critiques of actual hazardous materials incidents affecting the jurisdiction.

PI&M-5.3	Identify strategies to ensure that various organizations with a role under the plan provide feedback as changes occur that may affect the plan.
PI&M-6	Given implementation of an approved integrated hazardous materials plan for a jurisdiction or facility, participate in the design and development of an exercise program that is useful for evaluating and updating the plan.
PI&M-6.1	Describe five types of exercises and their appropriate use in plan evaluation, to include: • Drill • Orientation • Table top • Functional • Full Scale
PI&M-6.2	Identify the goals and objectives of the hazardous materials exercise program and its relationship to the overall planning process.
PI&M-6.3	Identify methods to be used for determining hazardous materials exercise needs, addressing at a minimum: • Number and type of exercises to be conducted • Functions to be tested (preparedness, response, recovery, and mitigation/ prevention) • Exercise goals and objectives • Appropriate scenarios
PI&M-6.4	Identify exercise criteria, resources, and reference materials.
PI&M-6.5	On specific exercises, establish effective policies and plans for working with the Exercise Manager, organizational participants, and others to: • Control the exercise • Recruit and brief participants • Record and evaluate exercise play • Critique exercise results and identify follow-up actions
PI&M-7	Given changes and trends that impact the plan or planning process, incident critiques, exercise results, expert opinion, and other information, develop strategies for conducting periodic reviews and updates of the plan.
PI&M-7.1	Determine whether goals and objectives established in the plan have been achieved.
PI&M-7.2	Evaluate changes and trends, incident critiques, exercise results, expert opinion, and other information to assess the need for plan revisions.
PI&M-7.3	Identify strategies for making the needed revisions to the plan and for implementing the plan revisions.
PI&M-7.4	Identify strategies and timetables for reviewing and updating the plan on a periodic basis.

Hazardous Materials
Planning Curriculum Guidelines:

Facility Planning

General Training Considerations

Scope/Objectives of Training

Facility Planners develop, validate, and maintain emergency response plans and safety plans for any facility subject to federal contingency planning regulations, as well as other facilities that wish to improve emergency preparedness through planning. They also develop procedures to ensure compliance with federal, state, and local mandates for participation in community planning and right-to-know activities. In this context, the term "facility" is meant to have a wide connotation and may include, but is not limited to, any mobile or fixed onshore or offshore building, structure, installation, equipment, pipe, or pipeline.

The Facility Planning specialty area provides participants with the knowledge and skills they need to develop a basic hazardous materials emergency plan for a facility. The primary training audience is facility planners and planning team members. Training objectives cover a broad range of generic competencies, including the ability to function effectively in a team environment, assist in or conduct a basic hazards analysis and capability assessment, work with others to analyze options and draft sections of the plan, and participate in plan implementation, evaluation, and maintenance.

The legislative and regulatory basis for this training can be found primarily in the requirements specified in OSHA 1910.120 for development of employers' emergency response plans, SARA Title III for development of planning jurisdictions' emergency response plans, and various federal agency regulations for the development of facility and transporter emergency response plans. The competencies defined here incorporate generic concepts and processes derived from various sources in the planning literature. Several of the most important reference documents, and more specific models for planning, are described in the Appendices. The training objectives are intended to be comprehensive, i.e., to address the requirements of all identified audience members; thus, training developers and instructors will need to tailor these objectives to meet local audience interests, needs, and planning processes.

Audience

The training audience for Facility Planning includes planning team members who have a defined responsibility in researching, preparing, implementing, and maintaining hazardous materials facility plans. These persons generally represent an organizational or functional specialty in an integrated planning process for the facility. Audience members may include industry owners and executives, business planners, production/process managers, functional managers (e.g., communications, public information, emergency response, etc.), safety officers, technical experts, and others employed by the facility. Personnel who have responsibilities for reviewing and approving facility plans and/or enforcing compliance with existing community regulations and standards may also benefit by training.

Prerequisites or Presumed Prior Knowledge/Skills of Students

Training covers basic skills, with an emphasis on the ability to interpret and use information provided by various technical specialists in developing the plan. More advanced planning skills are addressed under other Planning Specialties. Audience members are assumed to already possess training competencies covered under Planning Orientation, as well as an expertise in the professional discipline that the student represents on the planning committee. It is further assumed that managerial, administrative, and logistic requirements for organizing the planning process, including staff recruitment and assignments, have already been met.

Typical Program Format

Training can typically be accomplished in two to four days of classroom instruction led by an experienced facilitator. Breaking training into modules (e.g., Hazards Analysis) that are delivered at different times is also possible, and this approach may be beneficial if timed to coincide with planning team assignments. However, team building is very important in the planning process, so continuity of student groupings throughout training is recommended.

Methodology and Training Delivery Considerations

It is recognized that the planning needs of facilities, and the resulting training needs of planning team members, can vary greatly, depending on such factors as business size, demographics, product mix, hazards, local resources, and planning preferences. However, training described here is intended to address the generic training requirements of all hazardous materials facility planners. Training managers, course developers, and instructors may need to tailor these materials to meet the unique needs and interests of different audiences, incorporating elements covered in other Planning Specialties, as appropriate. Other training considerations include the following:

- Training should focus on the actual development of facility plans, with the work product and participation in the group planning process used to demonstrate student mastery of the objectives.
- Audiences should be heterogeneous, reflecting the diverse groups and professional disciplines represented in the planning process. It is highly recommended that team members who will work together in subsequent planning efforts be trained together.
- Course methodology should emphasize group interactions, team building, and resolution of interpersonal conflicts, as well as the development of the plan product itself.
- Course materials can be multi-tracked by type of plan (OSHA, EPA, etc.) to facilitate tailoring the instruction to the needs of different audiences.
- If possible, instruction should address practical strategies for consolidating planning requirements (i.e. merging several requirements into one plan development effort) to foster greater planning efficiency.
- Instruction should emphasize the need for on-going planning commitments by the team and the organizations they represent.
- Instruction should emphasize the need for ongoing evaluation at each step in the planning process.
- Instructors should emphasize that steps in the planning process, although taught sequentially, may actually be performed simultaneously.

Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as FACIL-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
FACIL-1	Given an assignment as a facility planning team member, describe an appropriate planning strategy and team member responsibilities in the process.
FACIL-1.1	Describe the benefits of a team approach to planning, and identify skills necessary to participate in the team planning process.
FACIL-1.2	Identify individual roles and responsibilities in the facility planning process, to include work expectations, administrative support systems, and time lines.

Recommended Training

FACIL-1.3	Identify the need to coordinate planning with outside groups (e.g., local government, surrounding jurisdictions, state offices, federal/regional offices such as EPA and FEMA, RRTs, and CAER.)
FACIL-1.4	Demonstrate understanding of the planning process mission statement, goals, and objectives.
FACIL-1.5	Describe the expected results of the planning process, to include required planning elements and plan format.
FACIL-1.6	Identify resources needed to conduct the planning process, including personnel, budgets, and technical capabilities, and solicit these resources within the company.
FACIL-2	Given an assignment as a facility planning team member, demonstrate the ability to conduct a review of federal, state, and local authorities applicable to the planning process.
FACIL-2.1	Describe the purpose and benefits of completing a review of existing plans and authorities.
FACIL-2.2	Identify methods and procedures for reviewing plans and authorities (collecting and organizing information, identifying and clarifying issues, identifying incompatibilities and shortfalls, etc.), including associated costs and staffing requirements.
FACIL-2.3	Identify planning regulatory requirements that apply to the facility, to include consideration of: • SARA Title III • EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)—40 CFR part 112.7(d) and 112.20 to 112.21 • MMS's Facility Response Plan Regulation—30 CFR part 254 • RSPA's Pipeline Response Plan Regulation—49 CFR part 194 • USCG's Facility Response Plan Regulation—33 CFR part 154, subpart F • EPA's Risk Management Programs Regulation—40 CFR part 68 • OSHA's Emergency Action Plan Regulation—29 CFR 1910.38(a) • OSHA's Process Safety Standard—29 CFR 1910.119 • OSHA's HAZWOPER Regulation—29 CFR 1910.120 • EPA's Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, subpart D, 40 CFR part 265, subpart D, and 40 CFR part 279.52 State and local policies, codes, ordinances, etc.
FACIL-2.4	Describe the advantages and disadvantages of all-hazard planning and hazard-specific planning.
FACIL-3	Given an assignment as a facility planning team member, demonstrate the ability to conduct background research appropriate to the planning requirement.

FACIL-3.1	Identify critical internal and external products, services, and operations that impact the facility plan, including: • Internal products and services and the facilities and equipment needed to produce them • External products and services provided by suppliers, especially sole source vendors • Services such as electrical power, water, sewer, gas, telecommunications, and transportation • Operations, equipment, and personnel vital to the continued functioning of the facility
FACIL-3.2	Identify, gather, and review copies of existing hazardous materials plans (community emergency plans, mitigation/prevention plans, response agency SOPs, facility plans, etc.).
FACIL-3.3	Review critiques of actual incidents, exercises, and drills conducted by the facility or by the community with participation by the facility.
FACIL-3.4	Review important changes and trends impacting the facility.
FACIL-3.5	Conduct surveys, interviews, etc. to gather expert opinion on planning needs, as required.
FACIL-3.6	Identify and summarize related planning issues, priorities, concerns, and challenges.
FACIL-4	Given the planning process to be used by the facility, identify the purpose, benefits, methods, expected results, and participant roles in hazards analysis and capability assessment.
FACIL-4.1	Describe the purpose and benefits of conducting a hazards analysis.
FACIL-4.2	Describe the purpose and benefits of conducting a capability assessment.
FACIL-4.3	Describe the methods to be used and the expected results of the facility's hazards analysis and capability assessment processes.
FACIL-4.4	Identify organizational and team member responsibilities in the facility's hazards analysis and capability assessment processes, including the roles of various technical specialists.
FACIL-5	Given the facility's production processes and potential hazards, demonstrate the ability to identify, collect, and interpret hazards analysis and capability assessment data needed for planning.
FACIL-5.1	Collect or assist in collecting data, as identified in *Technical Guidance for Hazards Analysis*.
FACIL-5.2	Identify types of emergencies that have occurred in the community, at the facility, and in similar facilities.

Recommended Training

FACIL-5.3	Identify geographic factors that could contribute to potential emergencies.
FACIL-5.4	Identify types of emergencies that could occur from technological process or system failures.
FACIL-5.5	Identify types of emergencies that could occur as a result of human error.
FACIL-5.6	Identify types of emergencies that could result from the design or construction of the facility and production processes.
FACIL-5.7	For each potential emergency, identify possible complications and relationships to other emergency events, and estimate the probability of occurrence.
FACIL-5.8	Identify and evaluate internal and external resources and capabilities that could be applied in an emergency.
FACIL-5.9	Conduct an insurance review to identify and evaluate facility insurance coverage and benefits in various types of emergency situations.
FACIL-5.10	Review and interpret the data.
FACIL-5.11	Identify, map, and prioritize hazards, risk areas, and vulnerable zones, and identify capability shortfalls and excesses (gap analysis).
FACIL-6	Given the results of the facility's hazards analysis and capability assessment, demonstrate the ability to identify issues and solutions to be addressed in the plan, and assignments for developing the plan.
FACIL-6.1	Identify issues and solutions to be addressed in the facility plan by examining existing plans, hazards analysis results, capability assessment results, and other pertinent information.
FACIL-6.2	Identify facility plan development tasks and assignments.
FACIL-7	Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating the hazardous materials emergency operations plan, to address preparedness, response and short-term recovery.
FACIL-7.1	Identify the planning elements necessary to comply with regulatory requirements, standards, and guidelines.
FACIL-7.2	Develop or update the emergency operations plan to meet the required planning elements.
FACIL-8	Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating a comprehensive prevention/mitigation section in the plan.
FACIL-8.1	Identify prevention/mitigation strategies and techniques to address the identified issues and solutions.

FACIL-8.2	Develop or update the plan to meet all identified prevention/mitigation planning needs.
FACIL-9	Given a draft facility hazardous materials plan, participate as assigned in the plan review and appraisal process.
FACIL-9.1	Describe the purpose and benefits of reviewing the facility plan.
FACIL-9.2	Conduct an internal review of the draft facility plan to assess adequacy and completeness.
FACIL-9.3	Facilitate an external review of the draft facility plan, which may include peer review, management review, and local, state and federal review.
FACIL-9.4	Make necessary revisions, and promote formal plan promulgation.
FACIL-10	Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for implementing the plan.
FACIL-10.1	Describe the purpose and benefits of implementing the plan.
FACIL-10.2	Describe the strategy and methods to be used for implementing the plan, to include: • Disseminating copies of the plan • Briefing and orienting users of the plan • Integrating the plan with other plans and work processes within the facility
FACIL-10.3	Identify options and develop strategies for coordinating the plan with multi-jurisdictional planning efforts.
FACIL-10.4	Identify options and develop strategies for ensuring that personnel are adequately trained to carry out their assigned responsibilities under the plan.
FACIL-10.5	Identify roles and responsibilities for implementing the plan, to include available resources, administrative systems, and time lines.
FACIL-11	Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for evaluating and maintaining the plan.
FACIL-11.1	Describe the purpose and benefits of evaluating and maintaining the plan.
FACIL-11.2	Identify options and develop strategies for monitoring changes and trends affecting the facility and/or jurisdiction.
FACIL-11.3	Identify options and develop strategies for critiquing actual incidents and accidents that occur, and for identifying and implementing remedial actions.
FACIL-11.4	Identify options and develop strategies for developing, conducting, and evaluating exercises and drills.

Recommended Training

FACIL-11.5	Identify options and develop strategies for conducting an annual audit of the facility plan and/or periodically updating and revising the facility plan, as necessary.
FACIL-11.6	Identify roles and responsibilities for evaluating and maintaining the facility plan, to include available resources, administrative systems, and time lines.
FACIL-11.7	Work with planning team members, facility managers, and other facility and community representatives to test planning concepts and measures (e.g., through tabletop exercises and drills), as necessary.

Hazardous Materials
Planning Curriculum Guidelines:

Planning for Public Education

General Training Considerations

Note: There are several aspects and potential training requirements associated with hazardous materials public education. These include training for Public Information Officers (PIOs) and others who design and develop related programs, strategies, and outreach materials; training for media representatives and others who influence the perceptions of the public; and training for planners in "marketing" the plan to gain public support for the planning process. The Planning Specialty area described here identifies general competencies for individual members of the public. Other facets of public education will be addressed in subsequent editions of the *Guidelines*.

Scope/Objectives of Training

Training in this curriculum area provides an overview of the hazardous materials emergency management system, with an emphasis on the citizen's role in that system. No skill development is attempted. Training should result in a positive attitudinal change, an improved awareness of threats to personal and community safety, an enhanced understanding of the need for and benefits of jurisdictional and facility planning and emergency management, and motivation to improve personal and community preparedness.

Benefits to be derived from training the general public include a greater understanding of and support for the jurisdiction's emergency management system and capabilities; improved citizen understanding of appropriate actions to take in hazardous materials emergency situations; heightened cooperation with responders and prevention/mitigation personnel; and enhanced citizen planning and preparedness for potential incidents in the home or neighborhood.

Audience

The audience for public education training includes all persons who have a "stake" in the hazardous materials emergency management system, although they have no defined role in the development and implementation of emergency operations and mitigation/prevention plans. Potential audience members include the general public, community groups, volunteer groups, business/industry associations, employee groups, and others with a self-interest in improving community and individual/family preparedness.

Prerequisites or Presumed Prior Knowledge/Skills of Students

Participants are assumed to have an interest in hazardous materials threats facing the community, as well as the jurisdiction's ability to provide effective hazardous materials emergency management. However, no prior knowledge of community plans and systems is required to participate in training.

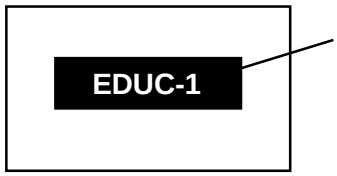
Typical Program Format

A short (one to two hours or as need is expressed by the customer) facilitator-led presentation or seminar.

Methodology and Training Delivery Considerations

Training should emphasize opportunities for interaction with audience members to identify and address individual perceptions and concerns. Whenever possible, use of dynamic media (video, slides, computer simulations, CD-ROM, etc.) is encouraged to promote interest and motivate support. Depending on audience needs and time, simple activities, exercises, or role plays emphasizing local examples and realistic personal situations may be appropriate.

The instructor should be able to discuss a broad range of topics of potential interest to audience members, including community and household hazardous materials threats; requirements of the Emergency Planning and Community Right to Know Act; pertinent jurisdiction and facility plans and capabilities; technical resources and ways to access community information (MSDS forms, chemical inventories, release reports, etc.), and materials available from EPA, DOT, FEMA, NIEHS, and other federal, state, and local sources.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as EDUC-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
EDUC-1	Given residency in a specific jurisdiction, identify the purpose, benefits, and components of the jurisdiction's hazardous materials emergency management system.
EDUC-1.1	Describe the hazardous materials threat within the jurisdiction, to include the routine use of chemicals by the general public from everyday sources.
EDUC-1.2	Identify major legislation affecting the jurisdiction's hazardous materials emergency management system, including the Emergency Planning and Community Right-to-Know Act.
EDUC-1.3	Describe the jurisdiction's hazardous materials emergency management system.
EDUC-1.3.1	Describe the four phases of the comprehensive emergency management system (preparedness, response, recovery, and mitigation/prevention).
EDUC-1.3.2	Explain the purpose and participants in the jurisdiction's integrated response system.
EDUC-1.3.3	Explain the purpose and participants in the jurisdiction's prevention and mitigation system.
EDUC-1.3.4	Describe general requirements for facility planning, safety management, and emergency response.
EDUC-1.4	Identify the purpose and participants in the jurisdiction's hazardous materials planning process.
EDUC-1.4.1	Identify the jurisdiction's LEPC planning district and planning requirements.
EDUC-1.4.2	Identify major steps and participants in the hazardous materials planning process, to include hazards analysis, capability assessment, plan development, and plan evaluation.

Recommended Training

EDUC-1.4.3	Identify major components in the jurisdiction's hazardous materials plan.
EDUC-2	Given residency in a specific jurisdiction, describe the citizen's role in the jurisdiction's hazardous materials emergency management system.
EDUC-2.1	Identify the personal and community benefits of citizen participation in the jurisdiction's hazardous materials emergency management system.
EDUC-2.2	Identify ways to participate in and contribute to the jurisdiction's hazardous materials emergency management system (e.g. provide feedback, serve as resource, attend meetings, join committees)
EDUC-2.3	Describe the citizens' role in individual and family preparedness.
EDUC-2.3.1	Identify steps in conducting a personal hazards analysis, to include threats to the neighborhood.
EDUC-2.3.2	Identify components of a personal and family preparedness plan.
EDUC-2.3.3	Identify steps in testing and maintaining personal/family preparedness plans.
EDUC-3	Given residency in a specific jurisdiction, identify personal actions to promote hazardous materials emergency management.
EDUC-3.1	Identify available sources of assistance and information and requirements for accessing them.
EDUC-3.2	Develop an action plan for promoting hazardous materials emergency management and personal/family preparedness.

Hazardous Materials
Planning Curriculum Guidelines:

Appendix A:
Planning Guide Summaries

Appendix A
Planning Guide Summaries

This appendix provides content summaries of key reference documents used in the preparation of the *Hazardous Materials Planning Curriculum Guidelines*. These materials include the *Guide for All-Hazard Emergency Operations Planning* (FEMA SLG 101), *Hazardous Materials Emergency Planning Guide* (NRT-1), *Technical Guidance for Hazards Analysis* (EPA/FEMA/DOT), *Handbook of Chemical Hazard Analysis Procedures* (FEMA/DOT/EPA), and *Emergency Management Guide for Business & Industry* (FEMA 141). More information on the planning models described in these materials is presented in Appendix B.

Federal Emergency Management Agency, *Guide for All-Hazard Emergency Operations Planning*, SLG 101, September 1996.

The Guide is designed as a "toolbox" of ideas and advice, not a sample emergency operations plan (EOP). It is intended primarily for use by personnel responsible for EOP development and maintenance in state and local emergency management agencies. It establishes no requirements, and its recommendations may be used, adapted, or disregarded.

This SLG replaces Civil Preparedness Guide (CPG) 1-8, *Guide for the Development of State and Local Emergency Operations Plans* (dated September 10, 1990); CPG 1-8A, *Guide for the Review of State and Local Emergency Operations Plans,* (dated October 1992); and CPG 1-10, *Guide for the Development of a State and Local Continuity of Government Capability* (dated July 27, 1987), which have been rescinded.

The document is organized as follows:

- Chapter 1 explains what an EOP is at the state and local levels, why the EOP is a necessary part of a comprehensive approach to emergency management, and how the EOP relates to other aspects of the comprehensive, risk-based, all-hazard approach.
- Chapter 2 describes the approach FEMA recommends for a step-by-step process of risk-based, all-hazard emergency operations planning (see Appendix B for more detail).
- Chapter 3 suggests how to format the results of the planning process in a written EOP. Components discussed include the Basic Plan, functional annexes, hazard-specific appendices, SOPs, and checklists.
- Chapter 4 lists and discusses elements of the Basic Plan, and provides detailed examples of the types of tasking that should be assigned to agencies, organizations, and individuals under the plan.
- Chapter 5 explains the purpose of functional annexes, and provides a brief description of eight core functions: Direction and Control, Communications, Warning, Emergency Public Information, Evacuation, Mass Care, Heath and Medical Services, and Resource Management.
- Chapter 6 notes unique aspects of certain hazards, including associated regulatory requirements. It suggests how to address hazardous materials in the all-hazard EOP rather than in a stand-alone plan. The chapter is not meant to replace hazard-specific planning guidance issued by the National Response Team.
- Chapter 7 contains information on integrating State EOPs with the Federal Response Plan, so that all levels of government can provide a coordinated response to communities in need.

National Response Team, *Hazardous Materials Emergency Planning Guide*, NRT-1, March 1987.

This guidance is intended to help local communities prepare for potential incidents involving hazardous materials. It describes how to form a local planning team, find a team leader, identify and analyze hazards, identify existing response equipment and personnel, write a plan, and keep the plan up to date. The information can be used both by local communities developing their own plan, and by local emergency planning committees formed in accord with the "Emergency Planning and Community Right-to-Know Act of 1986."

State officials seeking to develop a state emergency plan that is closely coordinated with local plans can adapt this guidance to their purposes. Likewise, officials of chemical plants, railroad yards, and shipping and trucking companies can use the guide to coordinate their own hazardous materials emergency planning with that of the local community.

The guidance deals specifically with response to hazardous materials incidents—both at fixed facilities (manufacturing, processing, storage, and disposal) and during transportation (highways, waterways, rail, and air). Plans for responding to radiological incidents and natural emergencies such as hurricanes, floods, and earthquakes are not the focus of this guidance, although most aspects of plan development and appraisal are common to these emergencies.

The guide is intended to focus community activity on emergency preparedness and response; provide communities with information useful in organizing the planning task; furnish criteria to determine risk and to help communities decide whether they need to plan for hazardous materials incidents; help communities conduct planning that is consistent with their needs and capabilities; and provide a method for continually updating a community's emergency plan.

The document is organized as follows:

Chapter 1: Introduction
Chapter 2: Selecting and Organizing the Planning Team
Chapter 3: Tasks of the Planning Team
Chapter 4: Developing the Plan
Chapter 5: Hazardous Materials Planning Elements
Chapter 6: Plan Appraisal and Continuing Planning

Several appendices provide helpful information for community planning. In particular, Appendix A includes a detailed summary of Title III of SARA, and Appendix D presents criteria that can be used to assess a state or local hazardous materials emergency response preparedness program.

U.S. Environmental Protection Agency, Federal Emergency Management Agency, and U.S. Department of Transportation, *Technical Guidance for Hazards Analysis*, December 1987.

The purpose of this guide is to help local emergency planning committees (LEPCs) conduct site-specific hazards analyses for airborne releases of extremely hazardous substances (EHSs), as required by Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). Although these substances may also threaten property and the environment, this guide is primarily concerned with lethal effects of airborne substances on humans.

This document represents a joint effort by EPA, FEMA, and DOT to provide coordinated and coherent technical guidance. Although the guide can be useful to all community and industry planners, it is intended especially for LEPCs established under the provisions of SARA. The three steps of hazards analysis—hazards identification, vulnerability analysis, and risk analysis—provide a decision-making process for the LEPCs to follow as they undertake the development of comprehensive emergency plans mandated by SARA Title III.

This document is organized as follows:

Chapter 1: Introduction and Overview

Chapter 2: Hazards Analysis: An Overview
- 2.1 - Hazards Identification
- 2.2 - Vulnerability Analysis for Airborne Extremely Hazardous Substances
- 2.3 - Risk Analysis

Chapter 3: Step-by-Step Procedures for Conducting a Hazards Analysis of Extremely Hazardous Substances

Chapter 4: Using the Results of a Hazards Analysis

Appendices:
- Appendix A: Acronyms and Glossary of Terms
- Appendix B: The Criteria Used to Identify Extremely Hazardous Substances
- Appendix C: The List of Extremely Hazardous Substances
- Appendix D: Additional Information on Levels of Concern
- Appendix E: Sample Profile
- Appendix F: Fire and Reactivity Hazards
- Appendix G: Equations Used for the Estimation of Vulnerable Zones
- Appendix H: General Considerations for Evacuation or In-Place Sheltering
- Appendix I: Information Collecting to Evaluate Sites for Emergency Planning
- Appendix J: Methods for Evaluating Hazards Used by Facilities
- Appendix K: Evaluation Guide for Available Computer Applications Addressing Hazardous Materials Emergency Response Planning
- Appendix L: Selected Bibliography
- Appendix M: EPA and FEMA Regional Contacts

Federal Emergency Management Agency, U.S. Department of Transportation, and U.S. Environmental Protection Agency, *Handbook of Chemical Hazard Analysis Procedures*.

The *Handbook of Chemical Hazard Analysis Procedures* has several objectives, one of which is to expand *NRT-1* and the *Technical Guidance on Hazards Analysis* documents by including information for explosive, flammable, reactive, and otherwise dangerous chemicals. Although *NRT-1* was aimed at addressing planning for all types of hazardous materials, SARA Title III required local planners to focus on a specific initial list of acutely toxic chemicals (referred to as Extremely Hazardous Substances) due to their high inhalation toxicity when airborne, and this was the primary focus of the supplemental guidance document. By introducing additional methodologies on how to plan for these and other dangerous chemicals, this handbook serves as a stepping stone from *NRT-1* and the *Technical Guidance on Hazards Analysis* to a more comprehensive approach for emergency planning.

Beyond providing additional methodologies for assessing the potential impacts of hazardous materials releases, this handbook also expands the three-step hazards analysis approach (hazard identification, vulnerability analysis, and risk analysis) presented in *NRT-1* and its supplement by introducing a four-step approach involving hazard identification, consequence analysis, probability analysis, and risk analysis. In addition, it provides a tutorial on hazardous chemicals, suggestions for applying hazard analysis results to writing and updating an emergency plan, and an expanded discussion of issues relating to sheltering-in-place (in-place protection) and evacuation.

The document is organized as follows:

Chapter 1: Introduction
Chapter 2: Key Properties of Chemical Substances
Chapter 3: Actions Upon Release to the Environment
Chapter 4: Fire Hazards of Chemical Substances

Chapter 5: Explosion Hazards of Chemical Substances
Chapter 6: Toxicity Hazards of Chemical Substances
Chapter 7: Reactivity Hazards of Chemical Substances
Chapter 8: Hazardous Material Classification Systems
Chapter 9: Overview of the Hazard Analysis Process
Chapter 10: Hazard Identification Guidelines
Chapter 11: Probability Analysis Procedures
Chapter 12: Consequence Analysis Procedures
Chapter 13: Formulation of a Planning Basis
Chapter 14: Use of Hazard Analysis Results in Emergency Planning

Appendices:
- Appendix A: A Tutorial on Fundamental Mathematical Skills
- Appendix B: Technical Basis for Consequence Analysis Procedures
- Appendix C: Overview of "Shelter-in-Place" Concepts
- Appendix D: Chemical Compatibility Chart
- Appendix E: Guide to Installation of the ARCHIE Computer Program
- Appendix F: Basis of Probability Analysis Procedures

Federal Emergency Management Agency, *Emergency Management Guide for Business and Industry,* FEMA 141, October 1993.

This guide provides step-by-step advice on how to create and maintain a comprehensive emergency management program. It can be used by manufacturers, corporate offices, retailers, utilities, or any organization where a sizable number of people work or gather. It applies equally to businesses large or small, whether they operate from a high-rise building or an industrial complex, and whether they own, rent or lease property.

Users of the document need not have in-depth knowledge of emergency management. All that is required is the authority to create a plan and a commitment from the chief executive officer to make emergency management part of the corporate culture.

Businesses that already have a plan can use this guide as a resource to assess and update the plan. The guide is organized as follows:

Section 1: Four Steps in the Planning Process—how to form a planning team; how to conduct a vulnerability analysis; how to develop a plan; and how to implement the plan. The information can be applied to virtually any type of business or industry.

Section 2: Emergency Management Considerations—how to build such emergency management capabilities as life safety, property protection, communications, and community outreach.

Section 3: Hazard-Specific Information—technical information about specific hazards the facility may face.

Section 4: Information Sources—where to turn for additional information.

Hazardous Materials
Planning Curriculum Guidelines:

Appendix B: Planning Models

Appendix B
Planning Models

Various explanations of the planning process can be found in the literature, including those described in the *Guide for All-Hazard Emergency Operations Planning* (FEMA SLG 101), *Hazardous Materials Emergency Planning Guide* (NRT-1), *Technical Guidance for Hazards Analysis* (EPA/FEMA/DOT), *Handbook of Chemical Hazard Analysis Procedures* (FEMA/DOT/EPA), and *Emergency Management Guide for Business & Industry* (FEMA 141). These approaches to planning, which are briefly described here, incorporate the generic functional requirements of planning, although the steps and procedures may be defined somewhat differently. Jurisdictions and facilities should select and/or modify these models to best meet their unique planning needs and preferences.

Federal Emergency Management Agency, *Guide for All-Hazard Emergency Operations Planning*, SLG 101, September 1996.

Chapter 2 of this Guide, The Planning Process, describes principles and major steps recommended for developing an all-hazard plan for protecting lives and property within the jurisdiction. In particular, the benefits of a team approach to planning are emphasized, including the role of the Chief Executive Official (CEO). Steps in the development and continual refinement of an emergency operations plan (EOP) are summarized as follows:

I. **Research**—This phase involves reviewing the jurisdiction's planning framework, analyzing the hazards faced by the jurisdiction, determining the resource base, and noting characteristics of the jurisdiction that could affect emergency operations. Steps in research include:

A. Review applicable laws, regulatory requirements, local plans, mutual aid agreements, and existing guidance.

B. Conduct a Hazard/Risk Analysis
   1. Identify hazards
      a. List hazards that concern emergency management
      b. Determine whether these hazards have occurred or could occur
   2. Profile hazards and their potential consequences
      a. Develop information on each hazard (frequency, magnitude, location, etc.)
      b. Develop information on the potential consequences of the hazard
   3. Compare and prioritize risks
   4. Create and apply scenarios

C. Determine the resource base—list and quantify resources available for emergency response and recovery. Compare them with those needed for an effective emergency response to determine shortfalls.

D. Note special facets of the planning environment—geographic and topographic features that may affect operations, transportation routes, special populations, demographic and other trends, etc.

II. **Development**—During this phase, the EOP is written through steps similar to these: developing a rough draft of the basic plan, functional annexes, and hazard-specific appendices; conducting preliminary briefings and interviews; conducting initial planning meetings and establishing committees for parts of the EOP; working with committees on successive drafts; preparing necessary graphics, and producing and circulating a final draft for planning team review and comment; holding meetings to obtain feedback and concurrence from organizations with identified responsibilities under the plan; obtaining official promulgation of the EOP; and printing and distributing the EOP.

III. **Validation**—During this phase, the EOP is checked for conformity to applicable regulatory requirements and the standards of federal and state agencies. Recommended steps include conducting tabletop exercises with key representatives of tasked organizations as a practical means to help validate the plan; consulting with and participating in plans reviews with the next level of government; and using functional and full-scale emergency management exercises to determine if an EOP is understood and "works."

IV. **Maintenance**—As problems emerge, situations change, gaps become apparent, and requirements are altered, the plan must be continually adapted to remain useful and up-to-date. Possible steps include:

A. Remedial Action Process designed to (1) capture information from exercises, post-disaster critiques, self-assessments, audits, administrative reviews, and the like which may indicate deficiencies; (2) bring together members of the planning team to discuss problems and to consider and assign responsibility for remedies; and (3) tracking and following up on assigned actions.

B. Revision Process for review and modification of the EOP on at least an annual basis.

C. Implementing Documents to ensure that each tasked organization or individual develops the SOPs necessary to facilitate the accomplishment of assigned tasks.

Attachment C of the Guide, Hazardous Materials, provides additional information on plan requirements for locating hazardous materials at fixed facilities and on transport routes, estimating vulnerable zones, determining vulnerability, and assessing risk. Planning considerations unique to hazardous materials are described under the following major headings:

- Direction and control
- Emergency public information
- Evacuation
- Mass care
- Health and medical
- Resource management

National Response Team, *Hazardous Materials Emergency Planning Guide*, NRT-1, March 1987.

This guidance presents a comprehensive approach to hazardous materials planning. However, it is emphasized that every community must plan according to its own situation. Small communities with few planning resources, or communities with few or no threatening hazards, can choose the planning elements appropriate to their circumstances. Steps in the planning process can be summarized as follows:

I. Organizing the Planning Process
   - A. Selecting the planning team
   - B. Selecting the team leader
   - C. Organizing for planning team responsibilities, including staffing, managing the planning tasks, and the use of computers

II. Review of Existing Plans
   - A. Reviewing applicable state and local emergency plans
   - B. Consulting with state and local agencies and volunteer organizations, regional offices of federal agencies, local industry and industrial associations, the RRT and OSC, etc.

III. Hazards Analysis
- A. Hazards Identification
- B. Vulnerability Analysis
- C. Risk Analysis

IV. Capability Assessment—sample questions are presented to help the planning team evaluate preparedness, prevention, and response resources and capabilities in the following three categories:
- A. Facility resources
- B. Transporter resources
- C. Community resources

V. Developing the Plan
- A. Developing or revising a hazardous materials appendix to a multi-hazard EOP
- B. Developing or revising a plan covering only hazardous materials

Planning elements and plan requirements that should be considered in this phase of the process are described in detail, including the following fourteen response functions:

- Initial Notification of Response Agencies
- Direction and Control
- Communication (among Responders)
- Warning Systems and Emergency Public Notification
- Public Information/Community Relations
- Resource Management
- Health and Medical
- Response Personnel Safety
- Personal Protection of Citizens
- Fire and Rescue
- Law Enforcement
- Ongoing Incident Assessment
- Human Services
- Public Works

VI. Plan Appraisal and Continuing Planning
- A. Plan Review and Approval
  1. Internal review
  2. External review
- B. Keeping the plan up-to-date
- C. Continuing planning
  1. Exercises
  2. Incident review
  3. Training

U.S. Environmental Protection Agency, Federal Emergency Management Agency, and U.S. Department of Transportation, *Technical Guidance for Hazards Analysis*, December 1987.

This guidance is compatible with and recommends the same approach to hazardous materials planning as NRT-1. However, significantly more detail is presented on the Hazards Analysis step of the process. The hazards analysis is separated into two phases. The first phase is the initial screening of all facilities reporting Extremely Hazardous Substances (EHSs) on their premises in excess of their threshold planning quantities (TPQs). The initial screening is performed to establish priorities among reporting facilities using credible worst case assumptions. The second phase represents a reassessment by order of priority of the potential hazards posed by the reporting facilities. This is accomplished through the reevaluation of the assumptions used for the initial screening.

Both the initial screening and the reevaluation phases utilize the three basic steps of hazards analysis: hazards identification, vulnerability analysis, and risk analysis. Steps in the process are summarized as follows:

Initial Screening

I. Hazards Identification

A. List facilities that have reported EHSs in the community in excess of the TPQ.
B. Contact each facility on the list for information on the EHSs present.
C. Obtain information on transportation routes of EHSs, if possible.
D. Obtain information on hazardous materials, facilities, and transportation routes (other than for those with EHSs above the TPQ) listed by SERCs (optional).

II. Vulnerability Analysis

A. Estimate the vulnerable zone for screening using credible worst case assumptions.
B. Identify characteristics of human populations within the estimated vulnerable zone.
C. Identify critical facilities within the estimated vulnerable zone.

III. Risk Analysis

A. Collect information obtained in hazards identification and vulnerability analysis.
B. Make rough estimate of risks based on the likelihood of a release and severity of consequences.
C. Identify those facilities with higher priority due to the estimated risks they pose.

Planning for Facilities by Priority

IV. Hazards Identification

A. Contact each facility on the list and other expert sources for additional information.
B. Obtain additional information on typical transportation conditions, if possible.

V. Vulnerability Analysis

A. Reestimate the vulnerable zone using reevaluated assumptions from the facility and other expert sources.
B. Identify characteristics of human populations within the estimated vulnerable zone.
C. Identify critical facilities within the estimated vulnerable zone.

VI. Risk Analysis

A. Collect all information obtained in hazards identification and vulnerability analysis in a table.
B. Obtain additional information on community and facility safeguards, response capabilities, and accident records.
C. Make a judgment of the probability of release and severity of consequences.
D. Organize all information (from A, B, and C) in a matrix format.
E. Rank risks.
F. Develop or revise emergency plans for higher priority facilities.

Federal Emergency Management Agency, U.S. Department of Transportation, and U.S. Environmental Protection Agency, *Handbook of Chemical Hazard Analysis Procedures*.

This guide presents four basic steps for conducting a hazard analysis, and a related fifth step that takes advantage of the knowledge gained during the effort to develop a comprehensive emergency plan. These steps include:

I. Hazard Identification—location, identification, and characterization of potential spill sources and accident sites in the jurisdiction or locality of concern. This step essentially concludes with the identification and/or postulation of fundamental accident scenarios requiring further consideration and analysis. Results from the probability analysis which follows can often help in further refining these scenarios. Methods discussed include:

- Enforcement of right-to-know laws
- Use of fire department and building inspection records
- Industry questionnaires
- Meetings with business organizations and trade groups
- Meetings with individual business personnel
- Queries of rail, marine, and pipeline transportation companies
- Truck traffic surveys
- Use of permit records
- Use of the “Yellow Pages”
- Access to detailed chemical property data and hazard information

II. Probability Analysis—evaluation of the likelihood of individual accident scenarios. This step permits examination and/or prioritization of potential accident scenarios in terms of their probability of occurrence. Categories of activities discussed include:

- Bulk transportation by highway
- Bulk transportation by rail
- Bulk transportation by barge or other marine vessel
- Transportation by pipeline
- Bulk storage, processing, or handling at fixed facilities
- Transportation of packaged hazardous materials
- Transportation by air

III. Consequence Analysis—evaluation of the consequences and impacts associated with the occurrence of postulated accident scenarios. This step provides an understanding of the nature and outcome of an accident and permits examination and/or prioritization of scenarios in terms of their potential impact on people and property. The Automated Resource for Chemical Hazard Incident Evaluation (ARCHIE) computer program and a set of hazard assessment procedures and models are discussed.

IV. Risk Analysis—combination of results from the accident probability and consequence analysis efforts to provide a measure of overall risk associated with the specific activity or activities. The effort permits examination and/or prioritization of scenarios in terms of *overall* risk. Steps include:

- Definition of annual accident probability categories
- Definition of accident severity categories
- Application of screening guidelines

V. Formulation of a Planning Basis—use of the results of the above activities during actual development and preparation of an emergency plan. The material includes discussion of 43 separate topics in 13 subject areas, as follows:

- Notification
- Command and Communications
- Evacuation
- Fire response
- Health Care
- Personal Protection
- Public Relations
- Spill Containment and Cleanup
- Spill Documentation
- Spill Monitoring
- Post-Spill Recovery
- Training
- Waste Disposal

Federal Emergency Management Agency, *Emergency Management Guide for Business & Industry*, FEMA 141, October 1993.

This document emphasizes the emergency planning and management needs of business and industry. Four steps are identified in the planning process, as follows:

I. Establish a Planning Team
   A. Form the team
   B. Establish authority
   C. Issue a mission statement
   D. Establish a schedule and budget

II. Analyze Capabilities and Hazards
   A. Where do you stand right now?
      1. Review internal plans and policies
      2. Meet with outside groups
      3. Identify codes and regulations
      4. Identify critical products, services, and operations
      5. Identify internal resources and capabilities
      6. Identify external resources
      7. Do an insurance review

   B. Conduct a vulnerability analysis
      1. List potential emergencies
      2. Estimate probability
      3. Assess the potential human impact
      4. Assess the potential property impact
      5. Assess the potential business impact
      6. Assess internal and external resources
      7. Add the columns

III. Develop the Plan
- A. Identify challenges and prioritize activities
- B. Write the plan
- C. Establish a training schedule
- D. Coordinate with outside organizations
- E. Maintain contact with other corporate offices
- F. Review, conduct training and revise
- G. Seek final approval
- H. Distribute the plan

IV. Implement the Plan
- A. Integrate the plan into company operations
- B. Conduct training (including exercises and drills)
- C. Evaluate and modify the plan

The guide also identifies planning considerations that are unique to hazardous materials, as well as core operational considerations of emergency management, in the following categories:

- Direction and Control
- Communications
- Life Safety
- Property Protection
- Community Outreach
- Recovery and Restoration
- Administration and Logistics

Hazardous Materials
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Appendix C: National Response Team's Integrated Contingency Plan Guidance

Note: This material was published in the Federal Register on Wednesday, June 5, 1996, and is reprinted in its entirety in this appendix. Page numbers shown are those from the Federal Register publication.

Federal Register

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June 5, 1996

Part II

Environmental Protection Agency

Department of Transportation

Coast Guard

Research and Special Programs Administration

Department of the Interior

Minerals Management Service

Department of Labor

Occupational Safety and Health Administration

The National Response Team's Integrated Contingency Plan Guidance; Notice

ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF TRANSPORTATION

Coast Guard

Research and Special Programs Administration

DEPARTMENT OF THE INTERIOR

Minerals Management Service

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

[FRL–5512–8]

The National Response Team's Integrated Contingency Plan Guidance

AGENCY: Environmental Protection Agency (EPA), U.S. Coast Guard (USCG), Minerals Management Service (MMS), Research and Special Programs Administration (RSPA), Occupational Safety and Health Administration (OSHA).

ACTION: Notice.

SUMMARY: The U.S. Environmental Protection Agency, as the chair of the National Response Team (NRT), is announcing the availability of the NRT's Integrated Contingency Plan Guidance (''one plan''). This guidance is intended to be used by facilities to prepare emergency response plans. The intent of the NRT is to provide a mechanism for consolidating multiple plans that facilities may have prepared to comply with various regulations into one functional emergency response plan or integrated contingency plan (ICP). This notice contains the suggested ICP outline as well as guidance on how to develop an ICP and demonstrate compliance with various regulatory requirements. The policies set out in this notice are intended solely as guidance.

ADDRESSES: Additional copies of this one-plan guidance can be obtained by writing to the following address: William Finan, U.S. Environmental Protection Agency, Mail Code 5101, 401 M Street SW, Washington, DC 20460. Copies of the ICP Guidance are also available by calling the EPCRA/RCRA/Superfund Hotline at (800) 424–9346 (in the Washington, DC, metropolitan area, (703) 412–9810). In addition, this guidance is available electronically at the home page of EPA's Chemical Emergency Preparedness and Prevention Office (http://www.epa.gov/swercepp/).

FOR FURTHER INFORMATION CONTACT: William Finan, U.S. Environmental Protection Agency, Mail Code 5101, 401 M Street, SW., Washington, DC 20460, at (202) 260–0030 (E-Mail homepage.ceppo@epamail.epa.gov—please include ''one plan'' in the subject line). In addition, the EPCRA/RCRA/Superfund Hotline can answer general questions about the guidance.

For further information and guidance on complying with specific regulations, contact: for EPA's Oil Pollution Prevention Regulation: Bobbie Lively-Diebold, U.S. Environmental Protection Agency, Mail Code 5203G, 401 M Street, SW., Washington, DC 20460, at (703) 356–8774 (E-Mail Lively.Barbara@epamail.epa.gov), or the SPCC Information Line at (202) 260–2342); for the U.S. Coast Guard's Facility Response Plan Regulation: LCDR Mark Hamilton, U.S. Coast Guard, Commandant (G–MOR), 2100 2nd Street, SW., Washington, DC 20593, at 202–267–1983 (E-Mail M.Hamilton/G-M03@CGSMTP.uscg.mil); for DOT/RSPA's Pipeline Response Plan Regulation: Jim Taylor, U.S. Department of Transportation, Room 2335, 400 7th Street, SW., Washington, DC 20590 at (202) 366–8860 (E-Mail OPATEAM@RSPA.DOT.GOV); for pertinent OSHA regulations, contact either your Regional or Area OSHA office; for DOI/MMS' Facility Response Plan Regulation: Larry Ake, U.S. Department of the Interior—Minerals Management Service, MS 4700, 381 Elden Street, Herndon, VA 22070–4817 at (703) 787–1567 (E-Mail Larry__Ake@SMTP.MMS.GOV); for EPA's Risk Management Program Regulation: William Finan (see above); and for RCRA's Contingency Planning Requirements, contact the EPCRA/RCRA/Superfund Hotline (see above).

The NRT welcomes comments on specific implementation issues related to this guidance. Please provide us with information about the successful use of this guidance, about problems with using this guidance, as well as suggestions for improving the guidance. Send comments to William Finan (see above) or to any of the other people listed in the previous paragraph.

SUPPLEMENTARY INFORMATION:

Presidential Review Findings

Section 112(r)(10) of the Clean Air Act required the President to conduct a review of federal release prevention, mitigation, and response authorities. The Presidential Review was delegated to EPA, in coordination with agencies and departments that are members of the National Response Team (NRT). The Presidential Review concluded that, while achieving its statutory goals to protect public safety and the environment, the current system is complex, confusing, and costly. It identified several key problem areas and recommended a second phase to address these issues. One of the issues identified by the Presidential Review is the multiple and overlapping federal requirements for facility emergency response plans.

NRT Policy Statement

This one-plan guidance is intended to be used by facilities to prepare emergency response plans for responding to releases of oil and non-radiological hazardous substances. The intent of NRT is to provide a mechanism for consolidating multiple plans that facilities may have prepared to comply with various regulations into one functional emergency response plan or integrated contingency plan (ICP). A number of statutes and regulations, administered by several federal agencies, include requirements for emergency response planning. A particular facility may be subject to one or more of the following federal regulations:

- EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)—40 CFR part 112.7(d) and 112.20–.21;
- MMS's Facility Response Plan Regulation—30 CFR part 254;
- RSPA's Pipeline Response Plan Regulation—49 CFR part 194;
- USCG's Facility Response Plan Regulation—33 CFR part 154, Subpart F;
- EPA's Risk Management Programs Regulation—40 CFR part 68;
- OSHA's Emergency Action Plan Regulation—29 CFR 1910.38(a);
- OSHA's Process Safety Standard—29 CFR 1910.119;
- OSHA's HAZWOPER Regulation—29 CFR 1910.120; and
- EPA's Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52.

In addition, facilities may also be subject to state emergency response planning requirements that this guidance does not specifically address. Facilities are encouraged to coordinate development of their ICP with relevant state and local agencies to ensure compliance with any additional regulatory requirements.

Individual agencies' planning requirements and plan review procedures are not changed by the advent of the ICP format option. This one-plan guidance has been developed

to assist facilities in demonstrating compliance with the existing federal emergency response planning requirements referenced above. Although it does not relieve facilities from their current obligations, it has been designed specifically to help meet those obligations. Adherence to this guidance is not required in order to comply with federal regulatory requirements. Facilities are free to continue maintaining multiple plans to demonstrate federal regulatory compliance; however, the NRT believes that an integrated plan prepared in accordance with this guidance is a preferable alternative.

The NRT realizes that many existing regulations pertaining to contingency planning require review by a specific agency to determine compliance with applicable requirements. It is not the intent of the NRT to modify existing agency review procedures or to supersede the requirements of a regulation.

This one-plan guidance was developed through a cooperative effort among numerous NRT agencies, state and local officials, and industry and community representatives. The NRT and the agencies responsible for reviewing and approving federal response plans to which the ICP option applies agree that integrated response plans prepared in the format provided in this guidance will be acceptable and be the federally preferred method of response planning. The NRT realizes that alternate formats for integrating multiple plans already exist and that others likely will be developed. Certain facilities may find those formats more desirable than the one proposed here. The NRT believes that a single functional plan is preferable to multiple plans regardless of the specific format chosen. While they are acceptable, other formats may not allow the same ease of coordination with external plans. In any case, whatever format a facility chooses, no individual NRT agency will require an integrated response planning format differing from the ICP format described here. The NRT anticipates that future development of all federal regulations addressing emergency response planning will incorporate use of the ICP guidance. Also, developers of state and local requirements will be encouraged to be consistent with this document.

The ICP guidance does not change existing regulatory requirements; rather, it provides a format for organizing and presenting material currently required by the regulations. Individual regulations are often more detailed than the ICP guidance. To ensure full compliance, facilities should continue to read and comply with all of the federal regulations that apply to them. Furthermore, facilities submitting an ICP (in whatever format) for agency or department review will need to provide a cross-reference to existing regulatory requirements so that plan reviewers can verify compliance with these requirements. The guidance contains a series of matrices designed to assist owners and operators in consolidating various plans and documenting compliance with federal regulatory requirements. (See Attachments 2 and 3.) The matrices can be used as the basis for developing a cross-reference to various regulatory requirements.

This guidance also provides a useful contingency planning template for owners and operators of facilities not subject to the federal regulations cited previously.

Integrated Contingency Plan Philosophy

The ICP will minimize duplication in the preparation and use of emergency response plans at the same facility and will improve economic efficiency for both the regulated and regulating communities. Facility expenditures for the preparation, maintenance, submission, and update of a single plan should be much lower than for multiple plans.

The use of a single emergency response plan per facility will eliminate confusion for facility first responders who often must decide which of their plans is applicable to a particular emergency. The guidance is designed to yield a highly functional document for use in varied emergency situations while providing a mechanism for complying with multiple agency requirements. Use of a single integrated plan should also improve coordination between facility response personnel and local, state, and federal emergency response personnel.

The adoption of a standard plan format should facilitate integration of plans within a facility, in the event that large facilities may need to prepare separate plans for distinct operating units. The ICP concept should also allow coordination of facility plans with plans that are maintained by local emergency planning committees (LEPCs),[1] Area Committees,[2] co-operatives, and mutual aid organizations. In some cases, there are specific regulatory requirements to ensure that facility plans are consistent with external planning efforts. Industry use of this guidance along with active participation on local and Area Committees will improve the level of emergency preparedness and is therefore highly encouraged.

In some areas, it may be possible to go beyond simple coordination of plans and actually integrate certain information from facility plans with corresponding areas of external plans. The adoption of a single, common ICP outline such as the one proposed in this guidance would facilitate a move toward integration of facility plans with local, state, and federal plans.

The projected results described above will ultimately serve the mutual goal of the response community to more efficiently and effectively protect public health, worker safety, the environment, and property.

Scope

This one-plan guidance is provided for any facility subject to federal contingency planning regulations and is also recommended for use by other facilities to improve emergency preparedness through planning. In this context, the term ''facility'' is meant to have a wide connotation and may include, but is not limited to, any mobile or fixed onshore or offshore building, structure, installation, equipment, pipe, or pipeline.

Facility hazards need to be addressed in a comprehensive and coordinated manner. Accordingly, this guidance is broadly constructed to allow for facilities to address a wide range of risks in a manner tailored to the specific needs of the facility. This includes both physical and chemical hazards associated with events such as chemical releases, oil spills, fires, explosions, and natural disasters.

Organizational Concepts

The ICP format provided in this one-plan guidance (See Attachment 1) is organized into three main sections: an introductory section, a core plan, and a series of supporting annexes. It is important to note that the elements contained in these sections are not new concepts, but accepted emergency response activities that are currently addressed in various forms in existing contingency planning regulations. The goal of the NRT is not to create new planning requirements, but to provide a mechanism to consolidate existing concepts into a single functional plan structure. This approach would provide a consistent basis for addressing

[1] LEPC plans are developed by LEPCs in coordination with facility emergency response coordinators under section 303 of the Emergency Planning and Community Right-to-Know Act.

[2] Area Contingency Plans are developed by Area Committees pursuant to section 4202(a)(6) of the Oil Pollution Act of 1990 (OPA).

emergency response concerns as it gains widespread use among facilities.

The introduction section of the plan format is designed to provide facility response personnel, outside responders, and regulatory officials with basic information about the plan and the entity it covers. It calls for a statement of purpose and scope, a table of contents, information on the current revision date of the plan, general facility information, and the key contact(s) for plan development and maintenance. This section should present the information in a brief factual manner.

The structure of the sample core plan and annexes in this guidance is based on the structure of the National Interagency Incident Management System (NIIMS) Incident Command System (ICS). NIIMS ICS is a nationally recognized system currently in use by numerous federal, state, and local organizations (e.g., some Area Committees under OPA). NIIMS ICS is a type of response management system that has been used successfully in a variety of emergency situations, including releases of oil or hazardous substances. NIIMS ICS provides a commonly understood framework that allows for effective interaction among response personnel. Organizing the ICP along the lines of the NIIMS ICS will allow the plan to dovetail with established response management practices, thus facilitating its ease of use during an emergency.

The core plan is intended to contain essential response guidance and procedures. Annexes would contain more detailed supporting information on specific response management functions. The core plan should contain frequent references to the response critical annexes to direct response personnel to parts of the ICP that contain more detailed information on the appropriate course of action for responders to take during various stages of a response. Facility planners need to find the right balance between the amount of information contained in the core plan versus the response critical annexes (Annexes 1 through 3). Information required to support response actions at facilities with multiple hazards will likely be contained in the annexes. Planners at facilities with fewer hazards may choose to include most if not all information in the core plan. Other annexes (e.g., Annexes 4 through 8) are dedicated to providing information that is non-critical at the time of a response (e.g., cross-references to demonstrate regulatory compliance and background planning information). Consistent with the goal of keeping the size of the ICP as manageable as practicable, it is not necessary for a plan holder to provide its field responders with all the compliance documentation (e.g., Annexes 4 through 8) that it submits to regulatory agencies. Similarly, it may not be necessary for a plan holder to submit all annexes to every regulatory agency for review.

Basic headings are consistent across the core plan and annexes to facilitate ease of use during an emergency. These headings provide a comprehensive list of elements to be addressed in the core plan and response annexes and may not be relevant to all facilities. Planners should address those regulatory elements that are applicable to their particular facilities. Planners at facilities with multiple hazards will need to address most, if not all, elements included in this guidance. Planners at facilities with fewer hazards may not need to address certain elements. If planners choose to strictly adopt the ICP outline contained in this guidance but are not required by regulation to address all elements of the outline, they may simply indicate ''not applicable'' for those items where no information is provided. A more detailed discussion of the core plan and supporting annexes follows.

Core Plan

The core plan is intended to reflect the essential steps necessary to initiate, conduct, and terminate an emergency response action: recognition, notification, and initial response, including assessment, mobilization, and implementation. This section of the plan should be concise and easy to follow. A rule of thumb is that the core plan should fit in the glovebox of a response vehicle. The core plan need not detail all procedures necessary under these phases of a response but should provide information that is time critical in the earliest stages of a response and a framework to guide responders through key steps necessary to mount an effective response. The response action section should be convenient to use and understandable at the appropriate skill level.

The NRT recommends the use of checklists or flowcharts wherever possible to capture these steps in a concise easy-to-understand manner. The core plan should be constructed to contain references to appropriate sections of the supporting annexes for more detailed guidance on specific procedures. The NRT anticipates that for a large, complex facility with multiple hazards the annexes will contain a significant amount of information on specific procedures to follow. For a small facility with a limited number of hazard scenarios, the core plan may contain most if not all of the information necessary to carry out the response thus obviating the need for more detailed annexes. The checklists, depending on their size and complexity, can be in either the core or the support section.

The core plan should reflect a hierarchy of emergency response levels. A system of response levels is commonly used in emergency planning for classifying emergencies according to seriousness and assigning an appropriate standard response or series of response actions to each level. Both complex and simple industrial facilities use a system of response levels for rapidly assessing the seriousness of an emergency and developing an appropriate response. This process allows response personnel to match the emergency and its potential impacts with appropriate resources and personnel. The concept of response levels should be considered in developing checklists or flowcharts designed to serve as the basis for the core plan. Note that for those facilities subject to planning requirements under OPA, response levels in the core plan may not necessarily correspond to discharge planning amounts (e.g., average most probable discharge, maximum most probable discharge, and worst case discharge).

Facility owners and operators should determine appropriate response levels based on 1) the need to initiate time-urgent response actions to minimize or prevent unacceptable consequences to the health and safety of workers, the public, or the environment; and 2) the need to communicate critical information concerning the emergency to offsite authorities. The consideration and development of response levels should, to the extent practicable, be consistent with similar efforts that may have been taken by the LEPC, local Area Committee, or mutual aid organization. Response levels, which are used in communications with offsite authorities, should be fully coordinated and use consistent terminology.

Annexes

The annexes are designed to provide key supporting information for conducting an emergency response under the core plan as well as document compliance with regulatory requirements not addressed elsewhere in the ICP. Annexes are not meant to duplicate information that is already contained in the core plan, but to augment core plan information. The annexes should relate to the basic

headings of the core plan. To accomplish this, the annexes should contain sections on facility information, notification, and a detailed description of response procedures under the response management system (i.e, command, operations, planning, logistics, and finance). The annexes should also address issues related to post accident investigation, incident history, written follow-up reports, training and exercises, plan critique and modification process, prevention, and regulatory compliance, as appropriate.

The ICP format contained in this guidance is based on the NIIMS ICS. If facility owners or operators choose to follow fundamental principles of the NIIMS ICS, then they may adopt NIIMS ICS by reference rather than having to describe the system in detail in the plan. The owner or operator should identify where NIIMS ICS documentation is kept at the facility and how it will be accessed if needed by the facility or requested by the reviewing agency. Regardless of the response management system used, the plan should include an organization chart, specific job descriptions,[3] a description of information flow ensuring liaison with the on-scene coordinator (OSC), and a description of how the selected response management system integrates with a Unified Command.[4] If a system other than NIIMS ICS is used, the plan should also identify how it differs from NIIMS or provide a detailed description of the system used.

The NRT anticipates that the use of linkages (i.e., references to other plans) when developing annexes will serve several purposes. Linkages will facilitate integration with other emergency plans within a facility (until such plans can be fully incorporated into the ICP) and with external plans, such as LEPC plans and Area Contingency Plans (ACPs). Linkages will also help ensure that the annexes do not become too cumbersome. The use of references to information contained in external plans does not relieve facilities from regulatory requirements to address certain elements in a facility-specific manner and to have information readily accessible to responders. When determining what information may be linked by reference and what needs to be contained in the ICP, response planners should carefully consider the time critical nature of the information. If instructions or procedures will be needed immediately during an incident response, they should be presented for ready access in the ICP. The following information would not normally be well-suited for reference to documents external to the ICP: core plan elements, facility and locality information (to allow for quick reference by responders on the layout of the facility and the surrounding environment and mitigating actions for the specific hazard(s) present), notification procedures, details of response management personnel's duties, and procedures for establishing the response management system. Although linkages provide the opportunity to utilize information developed by other organizations, facilities should note that many LEPC plans and ACPs may not currently possess sufficient detail to be of use in facility plans or the ICP. This information may need to be developed by the facility until detailed applicable information from broader plans is available.

In all cases, referenced materials must be readily available to anticipated plan users. Copies of documents that have been incorporated by reference need not be submitted unless it is required by regulation. The appropriate sections of referenced documents that are unique to the facility, those that are not nationally recognized, those that are required by regulation, and those that could not reasonably be expected to be in the possession of the reviewing agency, should be provided when the plan is submitted for review and/or approval. Discretion should be used when submitting documents containing proprietary data. It is, however, necessary to identify in the ICP the specific section of the document being incorporated by reference, where the document is kept, and how it will be accessed if needed by the facility or requested by the reviewing agency. In addition, facility owners or operators are reminded to take note of submission requirements of specific regulations when determining what materials to provide an agency for review as it may not be necessary to submit all parts of an ICP to a particular agency.

As discussed previously, this guidance contains a series of matrices designed to assist owners and operators in the plan consolidation process and in the process of ensuring and documenting compliance with regulatory requirements. The matrix in Attachment 2 to this guidance displays areas of current regulations that align with the suggested elements contained in this guidance document. When addressing each element of the ICP outline, plan drafters can refer to this matrix to identify specific regulatory requirements related to that element. The matrices in Attachment 3 to this guidance display regulatory requirements as contained in each of the regulations listed in the NRT policy statement above (which are applicable to many facilities) along with an indication of where in the suggested ICP outline these requirements should be addressed. If a facility chooses to follow the ICP outline, these matrices can be included as Annex 8 to a facility's ICP to provide the necessary cross-reference for plan reviewers to document compliance with various regulatory requirements. To the extent that a plan deviates from the suggested ICP outline, plan drafters will have to alter the matrices to ensure that the location of regulatory requirements within the ICP is clearly identified for plan reviewers.

Integrated Contingency Plan Elements

Presented below is a list of elements to be addressed in the ICP and a brief explanation, displayed in italicized text, of the nature of the information to be contained in that section of the ICP. Attachment 1 presents the complete outline of the ICP without the explanatory text. As discussed previously, the elements are organized into three main sections: plan introduction, core plan, and response annexes.

Section I—Plan Introduction Elements

1. Purpose and Scope of Plan Coverage

This section should provide a brief overview of facility operations and describe in general the physical area, and nature of hazards or events to which the plan is applicable. This brief description will help plan users quickly assess the relevancy of the plan to a particular type of emergency in a given location. This section should also include a list of which regulation(s) are being addressed in the ICP.

[3] OPA 90 planning requirements for marine transfer facilities (33 CFR 154.1035) require job descriptions for each spill management team member regardless of the response management system employed by the facility.

[4] Under NIIMS ICS, the command module has traditionally been represented by a single incident commander (supported by a command staff) who directs efforts of and receives input from the four supporting functional areas (planning, logistics, operations, and finance). More recently, a Unified Command System as described in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) found at 40 CFR part 300 has been used for larger spill responses where the command module is comprised of representatives from the federal government (i.e., federal on-scene coordinator), state government (state on-scene coordinator), and the responsible party working in a cooperative manner. Unified Command allows all parties who have jurisdictional or functional responsibility for the incident to jointly develop a common set of incident objectives and strategies. Such coordination should be guided by procedures found in the NCP (see figure 1a at 40 CFR 300.105(e)(1)) and the applicable Area Contingency Plan.

2. Table of Contents

This section should clearly identify the structure of the plan and include a list of annexes. This will facilitate rapid use of the plan during an emergency.

3. Current Revision Date

This section should indicate the date that the plan was last revised to provide plan users with information on the currency of the plan. More detailed information on plan update history (i.e., a record of amendments) may be maintained in Annex 6 (Response Critique and Plan Review and Modification Process).

4. General Facility Identification Information

a. Facility name
b. Owner/operator/agent (include physical and mailing address and phone number)
c. Physical address of the facility (include county/parish/borough, latitude/longitude, and directions)
d. Mailing address of the facility (correspondence contact)
e. Other identifying information (e.g., ID numbers, SIC Code, oil storage start-up date)
f. Key contact(s) for plan development and maintenance
g. Phone number(s) for key contact(s)
h. Facility phone number
i. Facility fax number

This section should contain a brief profile of the facility and its key personnel to facilitate rapid identification of key administrative information.

Section II - Core Plan Elements

1. Discovery

This section should address the initial action the person(s) discovering an incident will take to assess the problem at hand and access the response system. Recognition, basic assessment, source control (as appropriate), and initial notification of proper personnel should be addressed in a manner that can be easily understood by everybody in the facility. The use of checklists or flowcharts is highly recommended.

2. Initial Response

a. Procedures for internal and external notifications (i.e., contact, organization name, and phone number of facility emergency response coordinator, facility response team personnel, federal, state, and local officials)
b. Establishment of a response management system
c. Procedures for preliminary assessment of the situation, including an identification of incident type, hazards involved, magnitude of the problem, and resources threatened
d. Procedures for establishment of objectives and priorities for response to the specific incident, including:
  (1) Immediate goals/tactical planning (e.g., protection of workers and public as priorities)
  (2) Mitigating actions (e.g., discharge/release control, containment, and recovery, as appropriate)
  (3) Identification of resources required for response
e. Procedures for implementation of tactical plan
f. Procedures for mobilization of resources

This section should provide for activation of the response system following discovery of the incident. It should include an established 24-hour contact point (i.e., that person and alternate who is called to set the response in motion) and instructions for that person on who to call and what critical information to pass. Plan drafters should also consider the need for bilingual notification. It is important to note that different incident types require that different parties be notified. Appropriate federal, State, and local notification requirements should be reflected in this section of the ICP. Detailed notification lists may be included here or in Annex 2, depending upon the variety of notification schemes that a facility may need to implement. For example, the release of an extremely hazardous substance will require more extensive notifications (i.e., to State Emergency Response Commissions (SERCs) and LEPCs) than a discharge of oil. Even though no impacts or awareness are anticipated outside the site, immediate external notifications are required for releases of CERCLA and EPCRA substances. Again, the use of forms, such as flowcharts, checklists, call-down lists, is recommended.

This section should instruct personnel in the implementation of a response management system for coordinating the response effort. More detailed information on specific components and functions of the response management system (e.g., detailed hazard assessment, resource protection strategies) may be provided in annexes to the ICP.

This part of the plan should then provide information on problem assessment, establishment of objectives and priorities, implementation of a tactical plan, and mobilization of resources. In establishing objectives and priorities for response, facilities should perform a hazard assessment using resources such as Material Safety Data Sheets (MSDSs) or the Chemical Hazard Response Information System (CHRIS) manual. Hazardous Materials Emergency Planning Guide (NRT–1), developed by the NRT to assist community personnel with emergency response planning, provides guidance on developing hazard analyses. If a facility elects to provide detailed hazard analysis information in a response annex, then a reference to that annex should be provided in this part of the core plan.

Mitigating actions must be tailored to the type of hazard present. For example, containment might be applicable to an oil spill (i.e., use of booming strategies) but would not be relevant to a gas release. The plan holder is encouraged to develop checklists, flowcharts, and brief descriptions of actions to be taken to control different types of incidents. Relevant questions to ask in developing such materials include:

- *What type of emergency is occurring?*
- *What areas/resources have been or will be affected?*
- *Do we need an exclusion zone?*
- *Is the source under control?*
- *What type of response resources are needed?*

3. Sustained Actions

This section should address the transition of a response from the initial emergency stage to the sustained action stage where more prolonged mitigation and recovery actions progress under a response management structure. The NRT recognizes that most incidents are able to be handled by a few individuals without implementing an extensive response management system. This section of the core plan should be brief and rely heavily on references to specific annexes to the ICP.

4. Termination and Follow-Up Actions

This section should briefly address the development of a mechanism to ensure that the person in charge of mitigating the incident can, in coordination with the federal or state OSC as necessary, terminate the response. In the case of spills, certain regulations may become effective once the ''emergency'' is declared over. The section should describe how the orderly demobilization of response resources will occur. In addition, follow-up actions associated with termination of a response (e.g., accident investigation, response critique, plan review, written follow-up reports) should also be outlined in this section. Plan drafters

may reference appropriate annexes to the ICP in this section of the core plan.

Section III—Annexes

Annex 1. Facility and Locality Information

a. Facility maps
b. Facility drawings
c. Facility description/layout, including identification of facility hazards and vulnerable resources and populations on and off the facility which may be impacted by an incident

This annex should provide detailed information to responders on the layout of the facility and the surrounding environment. The use of maps and drawings to allow for quick reference is preferable to detailed written descriptions. These should contain information critical to the response such as the location of discharge sources, emergency shut-off valves and response equipment, and nearby environmentally and economically sensitive resources and human populations (e.g., nursing homes, hospitals, schools). The ACP and LEPC plan may provide specific information on sensitive environments and populations in the area. EPA Regional Offices, Coast Guard Marine Safety Offices, and LEPCs can provide information on the status of efforts to identify such resources. Plan holders may need to provide additional detail on sensitive areas near the facility. In addition, this annex should contain other facility information that is critical to response and should complement but not duplicate information contained in part 4 of the plan introduction section containing administrative information on the facility.

Annex 2. Notification

a. Internal notifications
b. Community notifications
c. Federal and state agency notifications

This annex should detail the process of making people aware of an incident (i.e., who to call, when the call must be made, and what information/data to provide on the incident). The incident commander is responsible for ensuring that notifications are carried out in a timely manner but is not necessarily responsible for making the notifications. ACPs, Regional Contingency Plans (RCPs), and LEPC plans should be consulted and referenced as a source of information on the roles and responsibilities of external parties that are to be contacted. This information is important to help company responders understand how external response officials fit into the picture. Call-down lists must be readily accessible to ensure rapid response. Notification lists provided in the core plan need not be duplicated here but need to be referenced.

Annex 3. Response Management System

This annex should contain a general description of the facility's response management system as well as contain specific information necessary to guide or support the actions of each response management function (i.e., command, operations, planning, logistics, and finance) during a response.

a. General

If facility owners or operators choose to follow the fundamental principles of NIIMS ICS (see discussion of annexes above), then they may adopt NIIMS ICS by reference rather than having to describe the response management system in detail in the plan. In this section of Annex 3, planners should briefly address either 1) basic areas where their response management system is at variance with NIIMS ICS or 2) how the facility's organization fits into the NIIMS ICS structure. This may be accomplished through a simple organizational diagram.

If facility owners or operators choose not to adopt the fundamental principles of NIIMS ICS, this section should describe in detail the structure of the facility response management system. Regardless of the response management system used, this section of the annex should include the following information:

- *Organizational chart;*
- *Specific job description for each position;*[5]
- *A detailed description of information flow; and*
- *Description of the formation of a unified command within the response management system.*

b. Command

(1) List facility Incident Commander and Qualified Individual (if applicable) by name and/or title and provide information on their authorities and duties.

This section of Annex 3 should describe the command aspects of the response management system that will be used (i.e., reference NIIMS ICS or detail the facility's response management system). The location(s) of predesignated command posts should also be identified.

(2) Information (i.e., internal and external communications).

This section of Annex 3 should address how the facility will disseminate information internally (i.e., to facility/response employees) and externally (i.e., to the public). For example, this section might address how the facility would interact with local officials to assist with public evacuation and other needs. Items to consider in developing this section include press release statement forms, plans for coordination with the news media, community relations plan, needs of special populations, and plans for families of employees.

(3) Safety.

This section of Annex 3 should include a process for ensuring the safety of responders. Facilities should reference responsibilities of the safety officer, federal/state requirements (e.g., HAZWOPER), and safety provisions of the ACP. Procedures for protecting facility personnel should be addressed (i.e., evacuation signals and routes, sheltering in place).

(4) Liaison—Staff Mobilization.

This section of Annex 3 should address the process by which the internal and external emergency response teams will interact. Given that parallel mobilization may be occurring by various response groups, the process of integration (i.e., unified command) should be addressed. This includes a process for communicating with local emergency management especially where safety of the general public is concerned.

c. Operations

(1) Operational response objectives
(2) Discharge or release control
(3) Assessment/monitoring
(4) Containment
(5) Recovery
(6) Decontamination
(7) Non-responder medical needs, including information on ambulances and hospitals
(8) Salvage plans

This section of Annex 3 should contain a discussion of specific operational procedures to respond to an incident. It is important to note that response operations are driven by the type of incident. That is, a response to an oil spill will differ markedly from a response to a release of a toxic gas to the air. Plan drafters should tailor response procedures to the particular hazards in place at the facility. A facility with limited hazards may have relatively few procedures. A larger more complex facility with numerous hazards is likely to have a series of procedures

[5] OPA 90 planning requirements for marine transfer facilities (33 CFR 154.1035) require job descriptions for each spill management team member regardless of the response management system employed by the facility.

designed to address the nuances associated with each type of incident.

d. Planning

(1) Hazard assessment, including facility hazards identification, vulnerability analysis, prioritization of potential risks.

This section of Annex 3 should present a detailed assessment of all potential hazards present at the facility, an analysis of vulnerable receptors (e.g., human populations, both workers and the general public, environmentally sensitive areas, and other facility-specific concerns) and a discussion of which risks deserve primary consideration during an incident. NRT–1 contains guidance on conducting a hazard analysis. Also, ACPs and LEPC plans may provide information on environmentally sensitive and economically important areas, human populations, and protection priorities. Plan drafters should address the full range of risks present at the facility. By covering actions necessary to respond to a range of incident types, plan holders can be prepared for small, operational discharges and large catastrophic releases. One approach that is required by certain regulations, such as the Clean Air Act (CAA) and OPA is to develop planning scenarios for certain types and sizes of releases (i.e., worst case discharge). Facilities may address such planning scenarios and associated calculations in this section of Annex 3 or as part of a separate annex depending on the size and complexity of the facility.

(2) Protection

This section of Annex 3 should present a discussion of strategies for protecting the vulnerable receptors identified through the hazard analysis. Primary consideration should be given to minimizing those risks identified as a high priority. Activities to be considered in developing this section include: population protection; protective booming; dispersant use, in-situ burning, bioremediation; water intake protection; wildlife recovery/ rehabilitation; natural remediation; vapor suppression; and monitoring, sampling, and modeling. ACPs and LEPC plans may contain much of this information.

(3) Coordination with natural resource trustees.

This section should address coordination with government natural resource trustees. In their role as managers of and experts in natural resources, trustees assist the federal OSC in developing or selecting removal actions to protect these resources. In this role, they serve as part of the response organization working for the federal OSC. A key area to address is interaction with facility response personnel in protection of natural resources.

Natural resource trustees are also responsible to act on behalf of the public to present a claim for and recover damages to natural resources injured by an oil spill or hazardous substance release. The process followed by the natural resource trustees, natural resource damage assessment (NRDA), generally involves some data collection during emergency response. NRDA regulations provide that the process may be carried out in cooperation with the responsible party. Thus, the facility may wish to plan for how that cooperation will occur, including designation of personnel to work with trustees in NRDA.

(4) Waste management.

This section should address procedures for the disposal of contaminated materials in accordance with federal, state, and local requirements.

e. Logistics

(1) Medical needs of responders
(2) Site security
(3) Communications (internal and external resources)
(4) Transportation (air, land, water)
(5) Personnel support (e.g., meals, housing, equipment)
(6) Equipment maintenance and support

This section of the Annex 3 should address how the facility will provide for the operational needs of response operations in each of the areas listed above. For example, the discussion of personnel support should address issues such as: volunteer training; management; overnight accommodations; meals; operational/ administrative spaces; and emergency procedures. The NRT recognizes that certain logistical considerations may not be applicable to small facilities with limited hazards.

f. Finance/procurement/administration

(1) Resource list
(2) Personnel management
(3) Response equipment
(4) Support equipment
(5) Contracting
(6) Claims procedures
(7) Cost documentation

This section of Annex 3 should address the acquisition of resources (i.e., personnel and equipment) for the response and monitoring of incident-related costs. Lists of available equipment in the local and regional area and how to procure such equipment as necessary should be included. Information on previously established agreements (e.g., contracts) with organizations supplying personnel and equipment (e.g., oil spill removal organizations) also should be included. This section should also address methods to account for resources expended and to process claims resulting from the incident.

Annex 4. Incident Documentation

a. Post accident investigation
b. Incident history

This annex should describe the company's procedures for conducting a follow-up investigation of the cause of the accident, including coordination with federal, State, and local officials. This annex should also contain an accounting of incidents that have occurred at the facility, including information on cause, amount released, resources impacted, injuries, response actions, etc. This annex should also include information that may be required to prove that the facility met its legal notification requirements with respect to a given incident, such as a signed record of initial notifications and certified copies of written follow-up reports submitted after a response.

Annex 5. Training and Exercises/Drills

This annex should contain a description of the training and exercise program conducted at the facility as well as evidence (i.e., logs) that required training and exercises have been conducted on a regular basis. Facilities may follow appropriate training or exercise guidelines (e.g., National Preparedness for Response Exercise Program Guidelines) as allowed under the various regulatory requirements.

Annex 6. Response Critique and Plan Review and Modification Process

This annex should describe procedures for modifying the plan based on periodic plan review or lessons learned through an exercise or a response to an actual incident. Procedures to critique an actual or simulated response should be a part of this discussion. A list of plan amendments (i.e., history of updates) should also be contained in this annex. Plan modification should be viewed as a part of a facility's continuous improvement process.

Annex 7. Prevention

Some federal regulations that primarily address prevention of accidents include elements that relate to contingency planning (e.g., EPA's RMP and SPCC regulations and OSHA's Process Safety Standard). This annex is designed to allow facilities to include

prevention-based requirements (e.g., maintenance, testing, in-house inspections, release detection, site security, containment, fail safe engineering) that are required in contingency planning regulations or that have the potential to impact response activities covered in a contingency plan. The modular nature of the suggested plan outline provides planners with necessary flexibility to include prevention requirements in the ICP. This annex may not need to be submitted to regulatory agencies for review.

Annex 8. Regulatory Compliance and Cross-Reference Matrices

This annex should include information necessary for plan reviewers to determine compliance with specific regulatory requirements. To the extent that plan drafters did not include regulatory required elements in the balance of the ICP, they should be addressed in this annex. This annex should also include signatory pages to convey management approval and certifications required by the regulations, such as certification of adequate response resources and/or statements of regulatory applicability as required by regulations under OPA authority. Finally, this annex should contain cross-references that indicate where specific regulatory requirements are addressed in the ICP for each regulation covered under the plan. As discussed previously, Attachment 3 contains a series of matrices designed to fulfill this need in those instances where plan drafters adhere to the outline contained in this guidance.

Attachment 1—ICP Outline

Section I—Plan Introduction Elements

1. Purpose and Scope of Plan Coverage
2. Table of Contents
3. Current Revision Date
4. General Facility Identification Information
   a. Facility name
   b. Owner/operator/agent (include physical and mailing address and phone number)
   c. Physical address of the facility (include county/parish/borough, latitude/longitude, and directions)
   d. Mailing address of the facility (correspondence contact)
   e. Other identifying information (e.g., ID numbers, SIC Code, oil storage start-up date)
   f. Key contact(s) for plan development and maintenance
   g. Phone number for key contact(s)
   h. Facility phone number
   i. Facility fax number

Section II—Core Plan Elements

1. Discovery
2. Initial Response
   a. Procedures for internal and external notifications (i.e., contact, organization name, and phone number of facility emergency response coordinator, facility response team personnel, federal, state, and local officials)
   b. Establishment of a response management system
   c. Procedures for preliminary assessment of the situation, including an identification of incident type, hazards involved, magnitude of the problem, and resources threatened
   d. Procedures for establishment of objectives and priorities for response to the specific incident, including:
   (1) Immediate goals/tactical planning (e.g., protection of workers and public as priorities)
   (2) Mitigating actions (e.g., discharge/release control, containment, and recovery, as appropriate)
   (3) Identification of resources required for response
   e. Procedures for implementation of tactical plan
   f. Procedure for mobilization of resources
3. Sustained Actions
4. Termination and Follow-Up Actions

Section III-Annexes

Annex 1. Facility and Locality Information

a. Facility maps
b. Facility drawings
c. Facility description/layout, including identification of facility hazards and vulnerable resources and populations on and off the facility which may be impacted by an incident

Annex 2. Notification

a. Internal notifications
b. Community notifications
c. Federal and state agency notifications

Annex 3. Response Management System

a. General
b. Command
   (1) List facility Incident Commander and Qualified Individual (if applicable) by name and/or title and provide information on their authorities and duties
   (2) Information (i.e., internal and external communications)
   (3) Safety
   (4) Liaison—Staff mobilization
c. Operations
   (1) Operational response objectives
   (2) Discharge or release control
   (3) Assessment/monitoring
   (4) Containment
   (5) Recovery
   (6) Decontamination
   (7) Non-responder medical needs including information on ambulances and hospitals
   (8) Salvage plans
d. Planning
   (1) Hazard assessment, including facility hazards identification, vulnerability analysis, prioritization of potential risks
   (2) Protection
   (3) Coordination with natural resource trustees
   (4) Waste management
e. Logistics
   (1) Medical needs of responders
   (2) Site security
   (3) Communications (internal and external resources)
   (4) Transportation (air, land, water)
   (5) Personnel support (e.g., meals, housing, equipment)
   (6) Equipment maintenance and support
f. Finance/procurement/administration
   (1) Resource list
   (2) Personnel management
   (3) Response equipment
   (4) Support equipment
   (5) Contracting
   (6) Claims procedures
   (7) Cost documentation

Annex 4. Incident Documentation

a. Post accident investigation
b. Incident history

Annex 5. Training and Exercises/Drills

Annex 6. Response Critique and Plan Review and Modification Process

Annex 7. Prevention

Annex 8. Regulatory Compliance and Cross-Reference Matrices

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Attachment 2: ICP Development Matrix

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
Section I - Plan Introduction Elements							
1. Purpose and scope of plan coverage	264.51 265.51 279.52(b)(1) 264.52(a) 265.52(a) 279.52(b)(2)(i)				38(a)(1)[1] 119(n) 272(d)	(l)[2] (p)(8) (q)(1)	
2. Table of contents		112.20(h) **Appendix F**	1035(a)(4)[3] 1030(b)	**Appendix A**			
3. Current revision date		**F1.2**	1035(a)(6)				
4. General facility identification information		**F1.2** **F1.9**		194.107(d)(1)(i) 194.113 194.113(b)(1)			
a. Facility name		**F1.2**	1035(a)(1)				
b. Owner/operator/ agent		112.20(h)(2) **F1.2** **F2.0**	1035(a)(3)	194.113(a)(1) **A-1**			
c. Physical address and directions		112.20(h)(2) **F1.2** **F2.0**	1035(a)(1) 1035(a)(2) 1035(e)	194.113(a)(2) 194.113(b)(3),(4) **A-1**			
d. Mailing address		112.20(h)(2)	1035(a)(1)	194.113(a)(1)			
e. Other identifying information							

[1] All citations refer to part 1910 unless otherwise noted.
[2] All citations refer to 29 CFR 1910.120 unless otherwise noted.
[3] All citations refer to part 154 unless otherwise noted.

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
f. Key contact(s) for plan development and maintenance					38(a)(2)(vi)	(l)(2)(i),(ii) (p)(8)(ii)(A),(B) (q)(2)(i),(ii)	
g. Phone number for key contact(s)							
h. Facility phone number		**F1.2** **F2.1**	1035(a)(1)				
i. Facility fax number			1035(a)(1)				
Section II - Core Plan Elements							
1. Discovery		112.20(h)(6) **F1.6.1, F1.6.2**	1035(b)(3)(i)	194.107(d)(1)(iii) **A-3**	119(n)	(l)(2)(iii) (p)(8)(ii)(C) (q)(2)(iii)	68.95(a)(1)(iii)
2. Initial response		112.20(h)(7)(i) **F1.3.6** **F1.7**	1035(b)(2)(ii) 1035(b)(3)(i) 1035(b)(3)(ii)	**A-2**	38(a)(2)(i) 38(a)(2)(ii) 119(n)	(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	68.95(a)(1)(iii)
a. Procedures for internal and external notifications	264.52(d) 265.52(d) 279.52(b)(2)(iv) 264.55 265.55 279.52(b)(5) 264.56(a)(1),(2) 265.56(a)(1),(2) 279.52(b)(6)(i)(A),(B) 264.56(d)(1),(2) 265.56(d)(1),(2) 279.52(b)(6)(iv)(A),(B)	112.20(h)(1)(iii) 112.20(h)(3)(iii) 112.20(h)(3)(iii) 112.20(h)(3)(iv) **F1.2** **F1.3.1**	1026 1035(a)(3) 1035(b)(1)(i) 1035(e)(2)	194.107(d)(1)(ii) 194.113(b)(2) **A-1, A-1(b)(2)** **A-2** **A-5**	38(a)(2)(v) 38(a)(2)(vi) 38(a)(3)(i) 38(a)(3)(ii) 165	(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	68.95(a)(1)(i)
b. Establishment of a response management structure	264.37 265.37 279.52(a)(6) 264.52(c) 265.52(c) 279.52(b)(2)(iii)	112.20(h)(1)(v) 112.20(h)(3)(v) **F1.3.4**	1035(b)(3)(iii)	194.107(d)(1)(v) **A-4** **A-9**		(l)(2)(i),(ii) (p)(8)(ii)(A),(B) (q)(2)(i),(ii) (q)(3)(i)	
c. Preliminary assessment	264.56(b),(c) 265.56(b),(c) 279.52(b)(6)(ii),(iii)	112.20(h)(3)(ix) 112.20(h)(4) **F1.4, F1.4.2**	1035(b)(3) 1035(b)(4)(i)	194.107(d)(1)(ii)	38(a)(2)(i) 38(a)(2)(ii)	(l)(2)(i) (l)(3)(vii) (p)(8)(ii)(A) (q)(2)(i) (q)(3)(ii),(iii)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
d. Establishment of objectives and priorities for response, including: **(1) Immediate goals/ tactical planning** **(2) Mitigating actions** **(3) Response resources**	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(1)(iv) 112.20(h)(1)(vii) 112.20(h)(3)(vi) 112.20(h)(3)(ix) 112.20(h)(7) **F1.3.2** **F1.7.1, F1.7.3**	1035(b)(2) 1035(b)(3)(iv),(v)	194.107(d)(1)(iii) 194.107(d)(1)(v)	38(a)(4) 119(n)	(l)(2)(vi),(viii) (p)(8)(ii)(F),(H) (q)(2)(vi),(viii) (p)(8)(iv)(F) (q)(3)(ii),(iii),(iv),(vi),(vii)	
e. Implementation of tactical plan	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(3)(ix) 112.20(h)(7)	1035(b)(2)(iii) 1035(b)(3) 1035(b)(4)(iii)	194.107(d)(1)(v) **A-3**	38(a)(2)(ii)	(l)(3)(vii) (p)(8)(iv)(F) (q)(3)(iii)	
f. Mobilization of resources	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(7) **F1.7.1**	1035(b)(2)(iii) 1035(b)(3) 1035(b)(4)(iii)	194.115 194.107(d)(1)(v) **A-1** **A-3**		(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	
3. Sustained actions		112.20(h)(7)	1035(b)(3)	194.107(d)(1)(v) **A-9**	38(a)(2)(iii)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	68.95(a)(1)(iii)
4. Termination and follow-up actions	264.56(i) 265.56(i)	112.20(h)(7)	1035(b)(3)			(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	68.95(a)(1)(iii)
Section III - Annexes							
1. Facility and locality information		112.20(h)(2) **F1.2** **F2.0**	1035(a) 1035(e)(1)	194.107(d)(1)(i) 194.113 194.113(b)(1)			
a. Facility maps		112.20(h)(1)(viii) **F1.9**		194.113(b)(2) **A-9**			
b. Facility drawings		112.20(h)(1)(viii) 112.20(h)(9) **F1.9**	1035(e)	**A-9**			
c. Facility description/ layout		**F1.9**	1035(b)(4)	**A-9**		(l)(3)(i)(A) (p)(8)(iv)(A)(1)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
2. Notification	264.52(d) 265.52(d) 279.52(b)(2)(iv) 264.56(a)(1),(2) 265.56(a)(1),(2) 279.52(b)(6)(i)(A),(B) 264.56(d)(1),(2) 265.56(d)(1),(2) 279.52(b)(6)(iv)(A),(B)	112.20(h)(1)(ii)		194.107(d)(1)(ii) **A-2**	119(n) 165(b)(1) 165(b)(4) 272(d)	(l)(3)(i)(B) (l)(2)(ix) (p)(8)(ii)(I) (p)(8)(iv)(A)(2) (q)(2)(ix)	68.95(a)(1)(i)
a. Internal		112.20(h)(3)(iii) **F1.3.1**	1035(b)(1)(i) 1035(b)(1)(ii) 1035(e)(2)	194.107(d)(1)(iv)	119(n) 165(b)(1)	(l)(2)(ix) (q)(2)(ix) (p)(8)(ii)**(I)**	
b. Community		112.20(h)(3)(iii) 112.20(h)(3)(ix) **F1.3.1**	1035(b)(1)(i) 1035(b)(1)(ii) 1035(e)(2)		119(n)	(l)(2)(i),(ii),(ix) (p)(8)(ii)(A),(B), **(I)** (q)(2)(i),(ii),(ix)	
c. Federal and state agency		112.20(h)(3)(iii) 112.20(h)(3)(ix) **F1.3.1**	1035(b)(1)(i) 1035(b)(1)(ii) 1035(e)(2)	194.107(d)(1)(vi)		(l)(2)(i),(ii),(ix) (p)(8)(ii)(A),(B),(I) (q)(2)(i),(ii),(ix)	
3. Response management structure		112.20(h)(1)(v) 112.20(h)(3)(v) **F1.3.4**	1035(b)(3)(iii)	194.107(d)(1)(v) **A-9**		(q)(3)(i)	
a. General	264.52(c) 265.52(c) 279.52(b)(2)(iii)		1035(b)(3)(iii)			(q)(3)(i)	
b. Command		112.20(h)(3)(iv)				(q)(3)(i)	
(1) Facility incident commander and qualified individual	264.55 265.55 279.52(b)(5)	112.20(h)(1)(i) **F1.2.5**	1026	**A-4**		(q)(3)(i)	
(2) Information	264.56(a)(1),(2) 265.56(a)(1),(2) 279.52(b)(6)(i)(A),(B)	112.20(h)(3)(iii)	1035(b)(3)(iii) 1035(e)(4)	194.107(d)(1)(v) **A-2**	38(a)(2)(vi) 38(a)(5)(iii)	(q)(3)(i)	
(3) Safety	264.52(f) 265.52(f) 279.52(b)(2)(vi)	112.20(h)(1)(vi) 112.20(h)(3)(vii) 112.20(h)(3)(viii) **F1.3.5**	1035(b)(3)(iii) 1035(e)(5)		38(a)(2)(i) 38(a)(2)(iii) 38(a)(2)(iv) 38(a)(4)	(l)(2)(iv),(vi) (p)(8)(ii)(D),(F) (q)(2)(iv),(vi) (q)(3)(vii),(viii)	
(4) Liaison			1035(b)(3)(iii)		38(a)(2)(vi)	(l)(2)(i),(ii) (p)(8)(ii)(A),(B) (q)(2)(i),(ii)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
c. Operations			1035(b)(3)(iii)	194.107(d)(1)(v)	38(a)(2)(i)-(iv)	(q)(3)(iii),(v)	
(1) Response objectives			1035(b)(2)(iii) 1035(b)(4)(iii)		38(a)(1)	(q)(3)(iii)	
(2) Discharge or release control	264.56(e) 265.56(e) 279.52(b)(6)(v)	112.20(h)(3)(i) 112.20(h)(7)(iv) 112.20(h)(1)(vii)	1035(b)(2) 1035(b)(2)(iii) 1035(b)(4)(iii)	194.107(d)(1)(v) **A-3**			
(3) Assessment/ monitoring	264.56(b),(c),(d),(f) 265.56(b),(c),(d),(f) 279.52(b)(6)(ii),(iii), (iv),(vi)	112.20(h)(3)(ix) **F1.7.1**	1035(b)(2)(iii) 1035(b)(3) 1035(b)(4)(iii)		38(a)(3)(ii) 38(a)(4)	(q)(3)(ii)	
(4) Containment	264.56(e) 265.56(e) 279.52(b)(6)(v)	112.20(h)(1)(vii) 112.20(h)(3)(i) 112.20(h)(7)(iv) **F1.7.3**	1035(b)(2)(iii) 1035(b)(3)(iv) 1035(b)(4)(iii)	194.107(d)(1)(v)			
(5) Recovery		112.20(h)(3)(i) 112.20(h)(7)(iii) **F1.7.2**	1035(b)(2)(iii) 1035(b)(3)(iv) 1035(b)(4)(iii)	194.107(d)(1)(v)			
(6) Decontamination	264.56(h)(2) 265.56(h)(2) 279.52(b)(6)(viii)(B)	112.20(h)(7)(iii) **F1.7.2**		194.107(d)(1)(v)		(k) (l)(2)(vii) (p)(8)(ii)(G) (q)(2)(vii) (q)(3)(ix)	
(7) Non-responder medical needs			1035(e)(5)		38(a)(2)(iv)	(l)(2)(viii) (p)(8)(ii)(H) (q)(2)(viii)	68.95(a)(1)(ii)
(8) Salvage plans				194.107(d)(1)(v)			
d. Planning				194.107(a) 194.115	38(a)(1) 38(a)(4)	(l)(2)(i),(ix) (p)(8)(ii)(A),(I) (q)(1) (q)(2)(i),(ix)	
(1) Hazard assessment		112.20(h)(3)(ix) 112.20(h)(4) 112.20(h)(5) 112.20(h)(7)(ii) **F1.4.1-F1.4.3** **F1.5.1, F1.5.2**	1029 1035(b)(4)(ii)	194.105 194.113(b)(6)	38(a)(4)	(l)(1)(ii)(C),(D) (p)(8)(iv)(A)(1),(F) (q)(3)(iii)	68.20-36 68.50 68.67
(2) Protection		112.20(h)(7)(i) 112.20(h)(7)(iv) **F1.7.1, F1.7.3**	1035(b)(4)			(l)(2)(iv),(v),(vi) (p)(8)(ii)(D),(E),(K) (q)(2)(iv),(v),(vi) (q)(3)(iii)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
(3) Coordination with natural resource trustees		112.20(g)	1030(f)	194.107(c)			
(4) Waste management	264.56(h)(1) 265.56(h)(1) 279.52(b)(6)(viii)(A) 264.56(g) 265.56(g) 279.52(b)(6)(vii)	112.20(h)(7)(iv) **F1.7.2**	1035(b)(5)	194.107(d)(1)(v)			
e. Logistics			1035(b)(3)(iii)			(l)(3)(iii) (p)(8)(iv)(B) (q)(2)(xii)	
(1) Medical needs			1035(e)(5)		38(a)(2)(iv)	(l)(2)(viii) (p)(8)(ii)(H) (q)(2)(viii)	68.95(a)(1)(ii)
(2) Site security		112.20(h)(10) **F1.10**				(l)(2)(v) (p)(8)(ii)(E) (q)(2)(v)	
(3) Communications		112.20(h)(1)(iv) 112.20(h)(3)(vi) **F1.3.2**	1035(e)(3)	194.107(d)(1)(v) **A-2**	38(a)(3) 119(e)(3)(iii) 165(b)	(q)(3)(i)	
(4) Transportation							
(5) Personnel support		112.20(h)(1)(v) 112.20(h)(1)(vi) 112.20(h)(3)(i-ii) 112.20(h)(3)(v) 112.20(h)(3)(vii) **F1.3.5**			38(a)(5)(i)	(l)(2)(ii) (p)(8)(ii)(B) (q)(2)(ii) (q)(3)(v),(vi)	
(6) Equipment maintenance and support		112.20(h)(1)(iv) 112.20(h)(3)(vi) 112.20(h)(8) **F1.3.3** **F1.8.1**	1035(b)(3)(iv) 1035(e)(3) 1057	194.107(d)(1)(viii)	119(j)(4) 119(j)(5) 165(d)	(l)(2)(xi) (p)(8)(ii)(K) (q)(2)(xi)	68.95(a)(2)
f. Finance/procurement/ administration		112.20(h)(3)(ix)	1028 1035(b)(3)(iii)				
(1) Resource list	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(1)(iv) 112.20(h)(3)(vi) **F1.3.2** **F1.7.1**	1035(b)(3)(iv) 1035(e)(3)				
(2) Personnel		112.20(h)(1)(v) 112.20(h)(3)(v) **F1.3.4**	1035(b)(3)(iv)				

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
(3) Response equipment	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(1)(iv) 112.20(h)(3)(vi) **F1.3.2** **F1.7.1**	1035(b)(2)(ii) 1035(b)(4)(iii) 1035(e)(3) **Appendix C**			(l)(2)(xi) (p)(8)(ii)(K) (q)(2)(xi)	
(4) Support equipment	264.52(e) 265.52(e) 279.52(b)(2)(v)	**F1.3.2** **F1.7.1**	1035(e)(3)				
(5) Contracting		112.20(h)(3)(ii)	1028(a)(1) 1035(e)(3)	194.115			
(6) Claims procedures							
(7) Cost documentation							
4. Incident documentation					38(a)(2)(iii) 119(e)(3)(ii)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	
a. Post-accident investigation	264.56(j) 265.56(j) 279.52(b)(6)(ix)				119(m)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	68.60 68.81
b. Incident history		112.20(h)(4) **F1.4.4**			119(e)(3)(ii)		68.42
5. Training and exercises/drills		112.20(h)(8) 112.21 **F1.8.2, F1.8.3**	1035(c) 1050 1055 **Appendix D**	194.107(d)(1)(vii) 194.107(d)(1)(ix) 194.117 **A-6** **A-7**	38(a)(5) 119(g)(1)(i)	(l)(3)(iv) (p)(8)(iii) (q)(6)	68.95(a)(3)
6. Response critique and plan review and modification process	264.54 265.54 279.52(b)(4)	112.20(g)	1035(a)(6) 1035(d) 1065	194.107(d)(1)(x) 194.111 194.119 194.121 **A-8**	119(l) 119(o)(1)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	68.95(a)(4)
7. Prevention						(l)(2)(iii) (p)(8)(ii)(C) (q)(2)(iii)	

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ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES

	ICP Citation(s)
RCRA (40 CFR Part 264 Subpart D [1], 40 CFR Part 265 Subpart D [2], 40 CFR Part 279.52(b) [3])	
264.52 Content of contingency plan:	
(a) Emergency response actions.[4]	
(b) Amendments to SPCC plan.	
(c) Coordination with State and local response parties [5]	II.2.b;III.3.a.
(d) Emergency coordinator(s)	II.2.a; III.2.
(e) Detailed description of emergency equipment on-site	II.2.d.(3); II.2.e; II.2.f; III.3.f.(1); III.3.f.(3); III.3.f.(4).
(f) Evacuation plan if applicable	III.3.b.(3).
264.53 Copies of contingency plan.	
264.54 Amendment of contingency plan	III.6.
264.55 Emergency coordinator	II.2.a; III.3.b.(1).
264.56 Emergency procedures:	
(a) Notification	II.2.a; III.2; III.3.b.(2).
(b) Emergency identification/characterization	II.2.c; III.3.c.(3).
(c) Health/environmental assessment	II.2.c; III.3.c.(3).
(d) Reporting	II.2.a; III.2; III.3.c.(3).
(e) Containment	III.3.c.(2); III.3.c.(4).
(f) Monitoring	III.3.b.(3); III.3.c.(3).
(g) Treatment, storage, or disposal of wastes	III.3.d.(4).
(h) Cleanup procedures:.	
(1) Disposal	III.3.d.(4).
(2) Decontamination	III.3.c.(6).
(i) Follow-up procedures	II.4.
(j) Follow-up report	III.4.a.
265.52 Content of contingency plan:	
(a) Emergency response actions.[6]	
(b) Amendments to SPCC plan.	
(c) Coordination with State and local response parties [7]	II.2.b; III.3.a.
(d) Emergency coordinator(s)	II.2.a; III.2.
(e) Detailed description of emergency equipment on-site	II.2.d.(3); II.2.e; II.2.f; III.3.f.(1); III.3.f.(3); III.3.f.(4).
(f) Evacuation plan if applicable	III.3.b.(3).
265.53 Copies of contingency plan.	
265.54 Amendment of contingency plan	III.6.
265.55 Emergency coordinator	II.2.a; III.3.b.(1).
265.56 Emergency procedures:	
(a) Notification	II.2.a; III.2; III.3.b.(2).
(b) Emergency identification/characterization	II.2.c; III.3.c.(3).
(c) Health/environmental assessment	II.2.c; III.3.c.(3).
(d) Reporting	II.2.a; III.2; III.3.c.(3).
(e) Containment	III.3.c.(2); III.3.c.(4).
(f) Monitoring	III.3.b.(3); III.3.c.(3).
(g) Treatment, storage, or disposal of wastes	III.3.d.(4).
(h) Cleanup procedures:	
(1) Disposal	III.3.d.(4).
(2) Decontamination	III.3.c.(6).
(i) Follow-up procedures	II.4.
(j) Follow-up report	III.4.a.
279.52(b)(2) Content of contingency plan:	
(i) Emergency response actions [8]	
(ii) Amendments to SPCC plan.	
(iii) Coordination with State and local response parties [9]	II.2.b; III.3.a.
(iv) Emergency coordinator(s)	II.2.a; III.2.
(v) Detailed description of emergency equipment on-site	II.2.d.(3); II.2.e; II.2.f; III.3.f.(1); III.3.f.(3); III.3.f(4).
(vi) Evacuation plan if applicable	III.3.b.(3).
(3) Copies of contingency plan.	
(4) Amendment of contingency plan	III.6.
(5) Emergency coordinator	II.2.a; III.3.b.(1).
(6) Emergency procedures:	
(i) Notification	II.2.a; III.2; III.3.b.(2).
(ii) Emergency identification/characterization	II.2.c; III.3.c.(3).
(iii) Health/environmental assessment	II.2.c; III.3.c.(3).
(iv) Reporting	II.2.a; III.2; III.3.c.(3).
(v) Containment	III.3.c.(2); III.3.c.(4).
(vi) Monitoring	III.3.b.(3); III.3.c.(3).
(vii) Treatment, storage, or disposal of wastes	III.3.d.(4).
(viii) Cleanup procedures:	
(A) Disposal	III.3.d.(4).
(B) Decontamination	III.3.c.(6).

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(ix) Follow-up report	III.4.a.
EPA's Oil Pollution Prevention Regulation (40 CFR 112)	
112.7(d)(1) Strong spill contingency plan and written commitment of manpower, equipment, and materials.[10,11]	
112.20(g) General response planning requirements	III.3.d.(3); III.6.
112.20(h) Response plan elements	I.2; III.8.
(1) Emergency response action plan (Appendix F1.1):	
(i) Identity and telephone number of qualified individual (F1.2.5)	III.3.b.(1).
(ii) Identity of individuals/organizations to contact if there is a discharge (F1.3.1)	III.2.
(iii) Description of information to pass to response personnel in event of a reportable spill (F1.3).	II.2.a.
(iv) Description of facility's response equipment and its location (F1.3.2)	II.2.d.(3); III.3.e.(3); III.3.e.(6); III.3.f.(1); III.3.f.(3).
(v) Description of response personnel capabilities (F1.3.4)	II.2.b; III.3; III.3.e.(5); III.3.f.(2);
(vi) Plans for evacuation of the facility and a reference to community evacuation plans (F1.3.5).	III.3.b.(3); III.3.e.(5)
(vii) Description of immediate measures to secure the source (F1.7.1)	II.2.d.(2); III.3.c.(2); III.3.c.(4).
(viii) Diagram of the facility (F1.9)	III.1.a–b.
(2) Facility information (F1.2, F2.0)	I.4.b–d; III.1.
(3) Information about emergency responses:	
(i) Identity of private personnel and equipment to remove to the maximum extent practicable a WCD or other discharges (F1.3.2, F1.3.4).	III.3.c.(2); III.3.c.(4)–(5); III.3.e.(5).
(ii) Evidence of contracts or other approved means for ensuring personnel and equipment availability.	III.3.e.(5); III.3.f.(5)
(iii) Identity and telephone of individuals/organizations to be contacted in event of a discharge (F1.3.1).	II.2.a; III.2.b–d; III.3.b.(2).
(iv) Description of information to pass to response personnel in event of a reportable spill (F1.3.1).	II.2.a.
(v) Description of response personnel capabilities (F1.3.4)	II.2.b; III.3; III.3.e.(5); III.3.f.(2).
(vi) Description of a facility's response equipment, location of the equipment, and equipment testing (F1.3.2, F1.3.3).	II.2.d.(3); III.3.e.(3); III.3.e.(6); III.3.f.(1); III.3.f.(3).
(vii) Plans for evacuation of the facility and a reference to community evacuation plans as appropriate (F1.3.5).	III.3.b.(3); III.3.e.(5).
(viii) Diagram of evacuation routes (F1.9).	III.3.b.(3).
(ix) Duties of the qualified individual (F1.3.6)	II.2.c; II.2.d.(1); I.2.e; III.2.b–c; III.3.c.(3); III.3.d.(1); III.3.f.
(4) Hazard evaluation (F1.4)	II.2.c; III.3.d.(1); III.4.b.
(5) Response planning levels (F1.5, F1.5.1, F1.5.2)	II.3.d.(1).
(6) Discharge detection systems (F1.6, F1.6.1, F1.6.2)	II.1.
(7) Plan implementation (F1.7)	II.2.d–f; II.3; II.4.
(i) Response actions to be carried out (F1.7.1.1)	II.2; III.3.d.(2).
(ii) Description of response equipment to be used for each scenario (F1.7.1.1)	III.3.d.(1).
(iii) Plans to dispose of contaminated cleanup materials (F1.7.2)	III.3.c.(5)–(6)
(iv) Measures to provide adequate containment and drainage of spilled oil (F1.7.3)	III.3.c.(2); III.3.c.(4); III.3.d.(2); III.3.d.(4).
(8) Self-inspection, drills/exercises, and response training (F1.8.1–F1.8.3.2)	III.3.e.(6); III.5.
(9) Diagrams (F1.9)	III.1.b.
(10) Security systems (F1.10)	III.3.e.(2).
(11) Response plan cover sheet (F2.0).	
112.21 Facility response training and drills/exercises (F1.8.2, F1.8.3)	III.5.
Appendix F Facility-Specific Response Plan:[12]	I.2.
1.0 Model Facility-Specific Response Plan.	
1.1 Emergency Response Action Plan.	
1.2 Facility Information	I.3; I.4.a; I.4.b–c; I.4.h; II.2.a; III.1.
1.3 Emergency Response Information:	
1.3.1 Notification	II.2.a; III.2.a–c.
1.3.2 Response Equipment List	II.2.d.(3); III.3.e.(3); III.3.f.(1); III.3.f.(3)–(4).
1.3.3 Response Equipment Testing/Deployment	III.3.e.(6).
1.3.4 Personnel	II.2.b; III.3; III.3.f.(2).
1.3.5 Evacuation Plans	III.3.b.(3); III.3.e.(5).
1.3.6 Qualified Individual's Duties	II.2.
1.4 Hazard Evaluation	II.2.c.
1.4.1 Hazard Identification	III.1.c; III.3.d.(1).
1.4.2 Vulnerability Analysis	II.2.c; III.3.d.(1).
1.4.3 Analysis of the Potential for an Oil Spill	III.3.d.(1).
1.4.4 Facility Reportable Oil Spill History	III.4.b.
1.5 Discharge Scenarios:	
1.5.1 Small and Medium Discharges	III.3.d.(1).
1.5.2 Worst Case Discharge	III.3.d.(1).
1.6 Discharge Detection Systems:	
1.6.1 Discharge Detection By Personnel	II.1.

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
1.6.2 Automated Discharge Detection	II.1.
1.7 Plan Implementation	II.2.
1.7.1 Response Resources for Small, Medium, and Worst Case Spills	II.2.d.(3); II.2.f; III.3.c.(3); III.3.d.(2); III.3.f.(1); III.3.f.(3)–(4).
1.7.2 Disposal Plans	III.3.c.(5)–(6); III.3.d.(4).
1.7.3 Containment and Drainage Planning	II.2.d; III.3.c.(4); III.3.d.(2).
1.8 Self-Inspection, Drills/Exercises, and Response Training:	
1.8.1 Facility Self-Inspection	III.3.e.(6).
1.8.2 Facility Drills/Exercises	III.5.
1.8.3 Response Training	III.5.
1.9 Diagrams	I.4; III.1.a–c.
1.10 Security	III.3.e.(2).
2.0 Response Plan Cover Sheet	I.4.b; I.4.c; I.4.h; III.1.
USCG FRP (33 CFR part 154)	
154.1026 Qualified individual and alternate qualified individual	II.2.a; III.3.b.(1).
154.1028 Availability of response resources by contract or other approved means	III.3.f or III.8; III.3.f.(5).
154.1029 Worst case discharge	III.3.d.(1).
154.1030 General response plan contents:.	
(a) The plan must be written in English.	
(b) Organization of the plan [13]	I.2.
(c) Required contents.	
(d) Sections submitted to COTP.	
(e) Cross-references	III.8.
(f) Consistency with NCP and ACPs	III.3.d.(3).
154.1035 Significant and substantial harm facilities:	
(a) Introduction and plan content	III.1.
(1) Facility's name, physical and mailing address, county, telephone, and fax	I.4.a; I.4.c–d; I.4.h–i
(2) Description of a facility's location in a manner that could aid in locating the facility	I.4.c.
(3) Name, address, and procedures for contacting the owner/operator on 24-hour basis.	I.4.b; II.2.a
(4) Table of contents	I.2.
(5) Cross index, if appropriate	III.8.
(6) Record of change(s) to record information on plan updates	I.3; III.6.
(b) Emergency Response Action Plan:	
(1) Notification procedures:	
(i) Prioritized list identifying person(s), including name, telephone number, and role in plan, to be notified in event of threat or actual discharge.	II.2.a; III.2.a–c.
(ii) Information to be provided in initial and follow-up notifications to federal, state, and local agencies.	III.3.b; III.2.a–c.
(2) Facility's spill mitigation procedures [14]	II.2.d.(2); III.3.c.(2).
(i) Volume(s) of persistent and non-persistent oil groups.	
(ii) Prioritized procedures/task delegation to mitigate or prevent a potential or actual discharge or emergencies involving certain equipment/scenarios.	II.2.
(iii) List of equipment and responsibilities of facility personnel to mitigate an average most probable discharge.	II.2.e–f; III.3.f.(3); III.3.c.(1)–(5).
(3) Facility response activities [15]	II.2.c; II.2.e–f; II.3; II.4; III.3.c.(3).
(i) Description of facility personnel's responsibilities to initiate/supervise response until arrival of qualified individual.	II.1; II.2.
(ii) Qualified individual's responsibilities/authority	II.2.
(iii) Facility or corporate organizational structure used to manage response actions	II.2.b; II.3; III.3.a; III.3.b.(2)–(4); III.3.c; III.3.d.(1); III.3.e–f.
(iv) Oil spill response organization(s)/spill management team available by contract or other approved means.	II.2.d.(3); III.3.c.(4)–(5); III.3.e.(6); III.3.f.(1)–(2); III.3.f.(5).
(v) For mobile facilities that operate in more than one COTP, the oil spill response organization(s)/spill management team in the applicable geographic-specific appendix.	II.2.d.(3).
(4) Fish and wildlife sensitive environments	III.1.c; III.3.d.(1)–(2).
(i) Areas of economic importance and environmental sensitivity as identified in the ACP that are potentially impacted by a WCD.	II.2.c.
(ii) List areas and provide maps/charts and describe response actions.	
(iii) Equipment and personnel necessary to protect identified areas	II.2.e–f; III.3.f.(3); III.3.c.(1)–(5).
(5) Disposal plan	III.3.d.(4).
(c) Training and exercises	III.5.
(d) Plan review and update procedures	III.6.
(e) Appendices	I.4.c; III.1.b.
(1) Facility specific information	III.1.
(2) List of contacts	II.2.a; III.2.a–c; III.3.b.(1).
(3) Equipment lists and records	III.3.e.(3); III.3.e.(6); III.3.f.(1); III.3.f.(3)–(5).
(4) Communications plan	III.3.b.(2).
(5) Site-specific safety and health plan	III.3.b.(3); III.3.c.(7); III.3.e. (1).

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(6) List of acronyms and definitions.	
(7) A geographic-specific appendix.	
154.1040 Specific requirements for substantial harm facilities.	
154.1041 Specific response information to be maintained on mobile MTR facilities.	
154.1045 Groups I–IV petroleum oils.	
154.1047 Group V petroleum oils.	
154.1050 Training	III.5.
154.1055 Drills	III.5.
154.1057 Inspection and maintenance of response resources	III.3.e.(6).
154.1060 Submission and approval procedures.	
154.1065 Plan revision and amendment procedures	III.6.
154.1070 Deficiencies.	
154.1075 Appeal Process.	
Appendix C—Guidelines for determining and evaluating required response resources for facility response plans.	III.3.f.(3).
Appendix D—Training elements for oil spill response plans	III.5.
DOT/RSPA FRP (49 CFR Part 194)	
194.101 Operators required to submit plans.	
194.103 Significant and substantial harm: operator's statement	III.8.
194.105 Worst case discharge	III.3.d.(1).
194.107 General response plan requirements:	
(a) Resource planning requirements	III.3.d.
(b) Language requirements.	
(c) Consistency with NCP and ACP(s)	III.3.d.(3); III.8.
(d) Each response plan must include:	
(1) Core Plan Contents:	
(i) An information summary as required in 194.113	I.4; III.1.
194.113(a) Core plan information summary:	
(1) Name and address of operator	I.4.b; I.4.d.
(2) Description of each response zone	I.4.c.
(b) Response zone appendix information summary:	
(1) Core plan information summary	I.4; III.1.
(2) Name^O^S^A^A^O Submission and approval procedures	III.6.
194.121 Response plan review and update procedures	III.6.
^Apendix^S^A^Aecommended guidelines for the preparation of response plans	I.2.
Section 1—Information summary	I.4.b–c; II.2.a; II.2.f; III.8.
Section 2—Notification procedures	II.2.a; III.2; III.3.b.(2); III.3.e.(3).
Section 3—Spill detection and on-scene spill mitigation procedures	II.1; II.2.e–f; III.3.c.(2).
Section 4—Response activities	II.2.b; III.3.b.(1).
Section 5—List of contacts	II.2.a.
Section 6—Training procedures	III.5.
Section 7—Drill procedures	III.5.
Section 8—Response plan review and update procedures	III.6.
Section 9—Response zone appendices	II.2.b; II.3; III.1.a–c; III.3.
OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	
1910.38(a) Emergency action plan:	
(1) Scope and applicability	III.3.c.(1); III.3.d.
(2) Elements:	
(i) Emergency escape procedures and emergency escape route assignments	II.2; II.2.c; III.3.b.(3); III.3.c.
(ii) Procedures to be followed by employees who remain to operate critical plant operations before they evacuate.	II.2; II.2.c; II.2.e; III.3.c.
(iii) Procedures to account for all employees after emergency evacuation has been completed.	II.2.a; III.3.b.(2); III.3.b.(3); III.3.c; III.4.
(iv) Rescue and medical duties for those employees who are to perform them	III.3.b.(3); III.3.c; III.3.c.(7); III.3.e.(1).
(v) The preferred means of reporting fires and other emergencies	II.2.a; III.3.b.
(vi) Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan.	I.4.f; II.2.a; III.3.b.(2); III.3.b.(4).
(3) Alarm system[16]	II.2.a; III.3.c.(3); III.3.e.(3).
(4) Evacuation	II.2.d; III.3.b.(3); III.3.c.(3); III.3.d; III.3.d.(1).
(5) Training	III.3.e.(5); III.5.
1910.119 Process safety management of highly hazardous chemicals:	
(e)(3)(ii) Investigation of previous incidents	III.4; III.4.b.
(e)(3)(iii) Process hazard analysis requirements	III.3.e.(3).
(g)(1)(i) Employee training in process/operating procedures	III.5.
(j)(4) Inspection/testing of process equipment	III.3.e.(6).
(j)(5) Equipment repair	III.3.e.(6).
(l) Management of change(s)	III.5.
(m) Incident investigation	III.4.a.

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(n) Emergency planning and response	I.1; II.1; II.2; II.2.d; III.2; III.2.a; III.2.b.
(o)(1) Certification of compliance	III.6.
1910.165 Employee alarm systems:	
(b) General requirements	III.3.e.(3).
(b)(1) Purpose of alarm system	III.2; III.2.a.
(b)(4) Preferred means of reporting emergencies	III.2.
(d) Maintenance and testing	III.3.e.(6).
1910.272 Grain handling facilities:	
(d) Development/implementation of emergency action plan	I.1; III.2.
OSHA HAZWOPER (29 CFR 1910.120)	
1910.120(k) Decontamination	III.3.c.(6).
1910.120(l) Emergency response program	I.1.
(1) Emergency response plan:	
(i) An emergency response plan shall be developed and implemented by all employers within the scope of this section to handle anticipated emergencies prior to the commencement of hazardous waste operations.	
(ii) Employers who will evacuate their employees from the workplace when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan complying with section 1910.38(a) of this part.	
(2) Elements of an emergency response plan:	
(i) Pre-emergency planning and coordination with outside parties	I.4.f; II.2.b; II.2.c; III.2.b; III.2.c; III.3.b.(4); III.3.d.
(ii) Personnel roles, lines of authority, and communication	I.4.f; II.2.b; III.2.a; III.2.c; III.3.b.(4); III.3.e.(4).
(iii) Emergency recognition and prevention	II.1; III.7.
(iv) Safe distances and places of refuge	III.3.b.(3); III.3.d.(2).
(v) Site security and control	III.3.d.(2); III.3.e.(2).
(vi) Evacuation routes and procedures	II.2.d; III.3.b.(3)
(vii) Decontamination procedures	III.3.c.(6).
(viii) Emergency medical treatment and response procedures	II.2.d; III.3.c.(7); III.3.e.(1).
(ix) Emergency alerting and response procedures	II.2; II.2.a; II.2.f; II.4; III.2; III.2.a; III.2.b; III.2.c; III.3.d.
(x) Critique of response and follow-up	II.3; III.4; III.4.a; III.6.
(xi) PPE and emergency equipment	III.3.e.(6); III.3.f.(3); III.3.d.(2); III.3.e.(6); III.3.f.(3).
(3) Procedures for handling emergency incidents:	
(i) Additional elements of emergency response plans:	
(A) Site topography, layout, and prevailing weather conditions	III.1.c.
(B) Procedures for reporting incidents to local, state, and federal government agencies.	II.2.a; III.2.
(ii) The emergency response plan shall be a separate section of the Site Safety and Health Plan.	
(iii) The emergency response plan shall be compatible with the disaster, fire, and/or emergency response plans of local, state, and federal agencies.	III.3.e.
(iv) The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.	III.5.
(v) The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.	
(vi) An employee alarm system shall be installed in accordance with 29 CFR 1910.165 to notify employees of an emergency situation; to stop work activities if necessary; to lower background noise in order to speed communications; and to begin emergency procedures.	
(vii) Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan.	II.2.c; II.2.d.
1910.120(p)(8) Emergency response program:	I.1
(i) Emergency response plan.	
(ii) Elements of an emergency response plan:	
(A) Pre-emergency planning and coordination with outside parties	I.4.f; II.2.b; II.2.b; III.2.b; III.2.c; III.3.b.(4); III.3.d.
(B) Personnel roles, lines of authority, and communication	I.4.f; II.2.b; III.2.c; III.2.c; III.3.b.(4); III.3.e.(4).
(C) Emergency recognition and prevention	II.1; III.7
(D) Safe distances and places of refuge	III.3.b.(3); III.3.d.(2)
(E) Site security and control	III.3.d.(2); III.3.e.(2)
(F) Evacuation routes and procedures	II.2.d; III.3.b.(3).
(G) Decontamination procedures	III.3.c.(6).
(H) Emergency medical treatment and response procedures	II.2.d; III.3.c.(7); III.3.e.(1).
(I) Emergency alerting and response procedures	II.2; II.2.a; II.2.f; II.4; III.2; III.2.a; III.2.b; III.2.c; III.3.d.

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(J) Critique of response and follow-up	II.3; III.4; III.4.a; III.6.
(K) PPE and emergency equipment	III.3.e.(6); III.3.f.(3); III.3.d.(2); III.3.e.(6); III.3.f.(3).
(iii) Training	III.5.
(iv) Procedures for handling emergency incidents:	
(A) Additional elements of emergency response plans:	
(1) Site topography, layout, and prevailing weather conditions	III.1.c; III.3.d.(1).
(2) Procedures for reporting incidents to local, state, and federal government agencies.	II.2.a; III.2.
(B) The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.	III.3.e.
(C) The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.	
(D) The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.	
(E) An employee alarm system shall be installed in accordance with 29 CFR 1910.165.	
(F) Based upon the information available at the time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan	II.2.d; II.2.e; III.3.d.(1).
1910.120(q) Emergency response to hazardous substance releases:	
(1) Emergency response plan	III.3.1.
(2) Elements of an emergency response plan:	
(i) Pre-emergency planning and coordination with outside parties	I.4.f; II.2.b; II.2.c; III.2.b; III.2.c; III.3.b.(4); III.3.d.
(ii) Personnel roles, lines of authority, training, and communication	I.4.f; II.2.b; III.2.b; III.2.c; III.3.b.(4); III.3.e.(4).
(iii) Emergency recognition and prevention	II.1; III.7.
(iv) Safe distances and places of refuge	III.3.b.(3); III.3.d.(2).
(v) Site security and control	III.3.d.(2); III.3.e.(2).
(vi) Evacuation routes and procedures	II.2.d; III.3.b.(3).
(vii) Decontamination procedures	III.3.c.(6).
(viii) Emergency medical treatment and response procedures	II.2.d; III.3.c.(7); III.3.e.(1).
(ix) Emergency alerting and response procedures	II.2; II.2.a; II.2.f; II.4; III.2; III.2.a; III.2.b; III.2.c; III.3.d.
(x) Critique of response and follow-up	II.3; III.4; III.4.a; III.6.
(xi) PPE and emergency equipment	III.3.e.(6); III.3.f.(3); III.3.d.(2); III.3.e.(6); III.3.f.(3).
(xii) Emergency response plan coordination and integration	III.3.e; III.8.
(3) Procedures for handling emergency response:	
(i) The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS).	II.2.b; III.3; III.3.a; III.3.b; III.3.b.(1); III.3.b.(2); III.3.e.(3).
(ii) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.	II.2.c; II.2.d; III.3.c.(3).
(iii) Implementation of appropriate emergency operations and use of PPE	II.2.c; II.2.d; II.2.e; III.3.c; III.3.c.(1); III.3.d.(1); III.3.d.(2).
(iv) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in emergency response.	II.2.d.
(v) The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to incident or site hazards, to those who are actively performing emergency operations.	III.3.c; III.3.e.(5).
(vi) Backup personnel shall stand by with equipment ready to provide assistance or rescue.	II.2.d; III.3.e.(5).
(vii) The individual in charge of the ICS shall designate a safety official, who is knowledgeable in the operations being implemented at the emergency response site.	II.2.d; III.3.b.(3).
(viii) When activities are judged by the safety official to be an IDLH condition and/or to involve an imminent danger condition, the safety official shall have authority to alter, suspend, or terminate those activities.	III.3.b.(3).
(ix) After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.	III.3.c.(6).

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(x) When deemed necessary for meeting the tasks at hand, approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating.	
(4) Skilled support personnel.	
(5) Specialist employees.	
(6) Training	III.5.
(7) Trainers.	
(8) Refresher training.	
(9) Medical surveillance and consultation.	
(10) Chemical protective clothing.	
(11) Post-emergency response operations.	
EPA's Risk Management Program (40 CFR Part 68)	
68.20–36 Offsite consequence analysis	III.3.d.(1).
68.42 Five-year accident history	III.4.b.
68.50 Hazard review	III.3.d.(1).
68.60 Incident investigation	III.4.a
68.67 Process hazards analysis	III.3.d.(1)
68.81 Incident investigation	III.4.a
68.95(a) Elements of an emergency response program:	
(1) Elements of an emergency response plan:	
(i) Procedures for informing the public and emergency response agencies about accidental releases.	II.2.a; III.2.
(ii) Documentation of proper first-aid and emergency medical treatment necessary to treat accidental human exposures.	III.3.c.(7); III.3.e.(1).
(iii) Procedures and measures for emergency response after an accidental release of a regulated substance.	II.1; II.2; II.3; II.4; III.3.a–c.
(2) Procedures for the use of emergency response equipment and for its inspection, testing, and maintenance.	III.3.e.(6).
(3) Training for all employees in relevant procedures	III.5.
(4) Procedures to review and update the emergency response plan	III.6.
68.95(b) Compliance with other federal contingency plan regulations.	
68.95(c) Coordination with the community emergency response plan.	

Notes to Attachment 3

[1] Facilities should be aware that most states have been authorized by EPA to implement RCRA contingency planning requirements in place of the federal requirements listed. Thus, in many cases state requirements may not track this matrix. Facilities must coordinate with their respective states to ensure an ICP complies with state RCRA requirements.

[2] Facilities should be aware that most states have been authorized by EPA to implement RCRA contingency planning requirements in place of the federal requirements listed. Thus, in many cases state requirements may not track this matrix. Facilities must coordinate with their respective states to ensure an ICP complies with state RCRA requirements.

[3] Facilities should be aware that most states have been authorized by EPA to implement RCRA contingency planning requirements in place of the federal requirements listed. Thus, in many cases state requirements may not track this matrix. Facilities must coordinate with their respective states to ensure an ICP complies with state RCRA requirements.

[4] Section 264.56 is incorporated by reference at § 264.52(a).

[5] Incorporates by reference § 264.37.

[6] Section 265.56 is incorporated by reference at § 265.52(a).

[7] Incorporates by reference § 265.37.

[8] Section 279.52(b)(6) is incorporated by reference at § 279.52(b)(2)(i).

[9] Incorporates by reference § 279.52(a)(6).

[10] Non-response planning parts of this regulation (e.g., prevention provisions) require a specified format.

[11] If a facility is required to develop a strong oil spill contingency plan under this section, the requirement can be met through the ICP.

[12] The appendix further describes the required elements in 120.20(h). It contains regulatory requirements as well as recommendations.

[13] Specific plan requirements for sections listed under 154.1030(b) are contained in 154.1035(a)–(g).

[14] Note: Sections 154.1045 and 154.1047 contain requirements specific to facilities that handle, store, or transport Group I–IV oils and Group V oils, respectively.

[15] Ibid.

[16] Section 1910.38(a)(3) incorporates 29 CFR 1910.165 by reference.

Dated: April 18, 1996.

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Assistant Administrator, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency.

Dated: April 22, 1996.

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Chief, Marine Safety and Environmental Protection Directorate, U.S. Coast Guard.

Dated: April 18, 1996.

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Dated: April 18, 1996.

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Director of Policy, Occupational Safety and Health Administration, Department of Labor.

Dated: April 18, 1996.

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Hazardous Materials
Planning Curriculum Guidelines

About the Planning Guidelines

The Planning Curriculum Guidelines are intended to assist public sector training managers and employers to understand the requirements for training public sector personnel involved in planning for hazardous materials emergencies. Existing regulatory requirements are defined, and training recommendations are offered to help public sector training mangers improve the quality and effectiveness of hazardous materials planning.

The Planning Curriculum Guidelines are organized into 14 sections. The first section addresses general planning training issues and includes:

- What is a plan?
- Requirements for hazardous materials planning.
- The planning process.
- The need to train.
- The scope of the planning Curriculum

The second through eleventh sections address training objectives that should be achieved by public sector employees performing various hazardous materials planning functions. The competency areas are:

- Planning Orientation
- Planning Essentials
- Planning Specialties
  - Commodity Flow Study
  - Hazard Analysis
  - Capability Assessment
  - Planning for Protective Actions
  - Plan Implementation and Maintenance
  - Facility Planning
  - Planning for Public Education

The final 3 sections are appendices provided a reference in using the *Guidelines,* and include:

- Appendix A: Planning Guide Summaries
- Appendix B: Planning Models
- Appendix C: National Response Team's Integrated Contingency Plan Guidance

Directions on the use of this material to assess and to support overall planning of training programs are provided in Hazardous Materials Training Program Management at the end of this document.

Hazardous Materials
Planning Curriculum Guidelines:

Planning
Training Issues

What is a Plan?

According to the Federal Emergency Management Agency (FEMA), an emergency operations plan (EOP) is a document that:

- Assigns responsibility to organizations and individuals for carrying out specific actions at projected times and locations in an emergency.
- Sets forth lines of authority and organizational relationships, and shows how all actions will be coordinated.
- Describes how people and property will be protected in emergencies and disasters.
- Identifies personnel, equipment, facilities, supplies, and other resources available for use during response and recovery operations.
- Identifies steps to address mitigation concerns during response and recovery activities.

The fundamental logic that underlies the development of emergency plans is that these and related decisions must be addressed before an incident occurs. During an emergency, no time exists to resolve such issues or to practice and refine roles and responsibilities. The complex analysis and preparation required to establish an effective emergency operations capability must be completed in advance so that public officials and response personnel can act quickly and decisively to control dangerous situations and protect the public.

Given this rationale, an emergency plan must be more than just a document. To be effective, all personnel who will participate in a hazardous materials emergency response must know their roles and responsibilities and be competent in the tasks they will perform. This goal is greatly enhanced by participation of tasked organizations in an integrated planning process, including exercising the plan and periodically revising the plan as needed.

The elements covered in a hazardous materials plan and the approach to planning will vary, depending on the jurisdiction's or facility's unique needs. However, all plans should contain: (1) an analysis of the emergencies likely to occur; (2) an assessment of available resources and existing capabilities; (3) detailed response operations strategies and assignments that address notification, command and control, life safety, and other functional requirements; and (4) identification of prevention measures that can mitigate the seriousness of an emergency or prevent it from occurring. The level of detail captured in the plan will also vary, but must be adequate to allow tasked organizations and individuals to develop comprehensive SOPs in their assigned areas.

Requirements for Hazardous Materials Planning

The responsibility to plan for and, if possible, prevent hazardous materials emergencies is a fundamental extension of the civic responsibility of state and local organizations to ensure the safety of responders and to protect the public. Congress recognizes this government responsibility for emergency management in the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended. Hazardous materials emergency planning is also required under a number of other federal laws and regulations.

The Emergency Planning and Community Right-to-Know Act (EPCRA)
Title III of Superfund Amendments and Reauthorization Act of 1986 (SARA)

EPCRA and Title III of SARA require the formation of state emergency response commissions (SERCs), tribal emergency response commissions (TERCs), emergency planning districts, and local emergency planning committees (LEPCs). Each LEPC must develop, exercise, and maintain an emergency plan that identifies: (1) facilities and transportation routes related to specific chemicals; (2) response procedures of facilities and local emergency and medical personnel; (3) names of community and facility emergency coordinators; (4) procedures for notifying officials and the public in the event of a hazardous material release; (5) methods for detecting a release and identifying areas and populations at risk; and (6) schedules for exercising the emergency plan.

OSHA 29 CFR Part 1910.120
The Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1910.120) require employers involved in hazardous waste operations to develop and implement an emergency response plan for employees. The elements of this plan must include: (1) recognition of emergencies; (2) methods and procedures for alerting employees; (3) evacuation procedures and routes; (4) means and methods for emergency medical treatment; (5) lines of authority; (6) on-site decontamination procedures; (7) site control means; and (8) methods for evaluating the plan.

Resource Conservation and Recovery Act (RCRA)
Under subtitle C of RCRA, the Environmental Protection Agency (EPA) implements standards for the treatment, storage, and disposal of hazardous wastes through permits issued by EPA or an authorized state. Permit requirements include a facility contingency plan, with required opportunities for local government and public comment and input into the plan development.

FEMA Emergency Operations Plan Requirements
Planning requirements for jurisdictions receiving FEMA funds are set forth in 44 CFR Part 302, effective May 12, 1986. This regulation requires states and local governments to prepare emergency operations plan (EOPs) that: (1) identify available personnel, equipment, facilities, supplies, and other resources in the jurisdiction; and (2) describe the method or scheme for coordinating actions taken by individuals and government services in the event of emergencies, including those involving hazardous materials.

Coordination with Federal Response
State and local hazardous materials emergency preparedness should include plans for coordination with and support for federal response to emergencies. The National Contingency Plan (NCP) is coordinated by the National Response Team under section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The NCP provides for federal support to local responders during hazardous materials transportation and fixed facility incidents. The Federal Response Plan (FRP), coordinated by FEMA, describes resources and support for state and local governments during natural and man-made disasters, including major hazardous materials emergencies.

Other Facility Planning Requirements
Facilities that store, handle, or transport certain types and quantities of hazardous materials may be subject to additional federal contingency planning regulations. In this context, the term “facility” is meant to have a wide connotation, and may include, but is not limited to, any mobile or fixed onshore or offshore building, structure, installation, equipment, pipe, or pipeline. A particular facility may be subject to one or more of the following federal regulations:

- EPA’s Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)— 40 CFR part 112.7(d) and 112.20 to 112.21
- MMS’s Facility Response Plan Regulation—30 CFR part 254
- RSPA’s Pipeline Response Plan Regulation—49 CFR part 194
- USCG’s Facility Response Plan Regulation—33 CFR part 154, subpart F
- EPA’s Risk Management Programs Regulation—40 CFR part 68
- OSHA’s Emergency Action Plan Regulation—29 CFR 1910.38(a)
- OSHA’s Process Safety Standard—29 CFR 1910.119
- EPA’s Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, subpart D, 40 CFR part 265, subpart D, and 40 CFR part 279.52

In addition, states and local jurisdictions may mandate regulatory requirements and procedures that must be considered in hazardous materials planning. Local governments and facilities are encouraged to coordinate the development of hazardous materials plans with relevant state and local agencies to ensure compliance with any additional regulatory requirements.

General Training Issues

The Planning Process

There is no single correct way to write a hazardous materials emergency plan. Each entity must plan according to its own situation, based on such factors as geographic size, types of hazards, populations at risk, resources, and level of preparedness. Jurisdictions and facilities should choose the planning elements and processes most appropriate to their circumstances. However, every community and industry needs to evaluate its preparedness for hazardous materials incidents and plan accordingly.

Various explanations of the planning process can be found in the literature, including those described in the *Guide for All-Hazard Emergency Operations Planning* (FEMA SLG 101), *Hazardous Materials Emergency Planning Guide* (NRT-1), *Technical Guidance for Hazards Analysis* (EPA/FEMA/DOT), *Handbook of Chemical Hazard Analysis Procedures* (FEMA/DOT/EPA), and *Emergency Management Guide for Business & Industry* (FEMA 141). These documents and approaches to planning, which are briefly described in Appendices A and B, incorporate the generic functional requirements of planning, although the steps and procedures may be defined somewhat differently. Jurisdictions and facilities should review these and/or other models to select a process that best meets their unique planning needs and preferences.

Whatever model is adopted for the planning process, a team approach is strongly recommended. A planning team is the best mechanism for incorporating the various types of expertise needed in planning, building consensus among organizations and individuals affected by the plan, and promoting professional relationships and understanding among responders. Team members can also help ensure that plans are adequately implemented, evaluated, and maintained after promulgation, and that personnel are given the training and tools they need to achieve competency in their assigned roles and responsibilities.

No specific format is mandated for the results of hazardous materials planning. SLG 101 discusses format options for all-hazard and hazard-specific community plans. NRT's *Integrated Contingency Plan Guidance* (see Appendix C) describes an approved format for consolidating multiple plans that facilities may have to prepare in compliance with various federal regulations. However, a format is "good" if users understand it, are comfortable with it, and can extract the information they need. FEMA recommends that planning teams consider the following design characteristics when deciding upon a format: organization, progression, consistency, adaptability, and compatibility.

The approach taken in these *Guidelines* identifies two fundamental planning products, both of which are derived from a common hazards analysis and capability assessment base: (1) an emergency operations plan that addresses preparedness for, response to, and short-term recovery from hazardous materials incidents; and (2) a prevention/mitigation section of the plan that addresses measures designed to eliminate or reduce the effects of potential emergencies (e.g., land use planning, building codes, inspections, equipment testing, release detection, site security, containment, and fail safe engineering). Note that community development planning, long-term recovery, and organizational administrative planning (financial management, personnel management, record keeping, labor relations, etc.) are outside the intended scope of the *Guidelines*.

The Need to Train

The skill and training of individual responders is only one aspect of safe and effective emergency operations. Hazardous materials incidents are complex and involve the coordinated and timely actions of many different persons, often under stressful conditions. The quality of this coordination—based on clearly defined lines of authority, adequate communication systems, availability of resources when needed, etc.—may play a more important role than individual responder training in minimizing injuries and maximizing control of the emergency.

In hazardous materials emergencies, the importance of pre-response planning cannot be overstated. Plans provide a mechanism for evaluating operational strategies, defining roles and procedures, communicating organizational assignments, and assessing the adequacy of responder training. The integrated team planning process fosters trust and cooperation among individuals and organizations that must work together during an incident. Planning also leads to effective mitigation and prevention measures, thus providing communities and facilities with an opportunity to eliminate or reduce the costly and tragic effects of hazardous materials incidents before they occur.

Effective response and prevention planning depends upon the ability of the people who do the work. The quality of hazard analyses and capability assessments, and the effectiveness of response and prevention plans, is directly related to the competency of the personnel assigned responsibility for performing related tasks—public and private sector officials, agency and program managers, planners, technical experts, and many others.

OSHA's regulation 29 CFR 1910.120(q) requires that all employees be properly trained to perform their roles in response to hazardous materials emergencies. Employers are not now federally required to train personnel involved in planning. However, federal guidelines strongly recommend that all personnel who participate in the hazardous materials planning process at the state and local levels be trained to full competency to perform their roles.

The Scope of the Planning Curriculum

The *Hazardous Materials Planning Curriculum* addresses training needed by persons who have a defined role in the development, implementation, evaluation, and maintenance of hazardous materials emergency plans and standard operating procedures (SOPs). These critical documents must be prepared by state governments, local communities/jurisdictions, community support services organizations (hospitals, schools, mass care, business/industry, etc.), public sector agencies, and private sector facilities that store, use, or transport significant quantities of hazardous materials.

Training requirements for the curriculum span a tremendous variety of functions, skills, and audiences. In the public sector, functional responsibilities include directing and controlling the planning process, collecting data and managing information, identifying hazards, analyzing related vulnerabilities, estimating risk, assessing capabilities, serving as operational experts in writing plans and SOPs, implementing and integrating the results with other planning efforts, designing and evaluating complex exercises, and updating the plan on a regular basis. Individuals performing this work include community officials, SERC and LEPC members, agency and program managers, emergency managers, fire service workers, police, emergency medical services personnel, public works officials, community services and volunteer organization representatives, consultants and technical experts, and many others.

In the private sector, similar roles and functions must be performed. In addition, facilities that meet certain criteria must also conduct technically sophisticated analyses for chemicals they store, handle, or transport; develop production/process safety management plans and employee safety plans; and comply with employee and community right-to-know requirements and other reporting mandates. Potential training audiences include industry owners and executives, business planners, production/process managers, functional managers (e.g., communications, public information, emergency response, etc.), safety officers, technical experts, and others employed by the facility. Local government personnel who have responsibilities for reviewing and approving facility plans and/or enforcing compliance with existing regulations and standards may also benefit by training in this area.

This diversity of audiences and roles presents a special challenge for hazardous materials training management. Access to training audiences is more complex because the interdisciplinary nature of the audience suggests a broad range of possible training delivery mechanisms. Audience members may have limited time available for training in planning since this role is often viewed as an ancillary duty to primary work responsibilities. Finally, hazardous materials training resources may be limited, necessitating an emphasis on response training, with planning and prevention receiving a lower organizational priority.

General Training Issues

Organization of the Planning Curriculum Guidelines

The goal of the *Hazardous Materials Planning Curriculum* is to enhance the knowledge, skills, and attitudes of a broad spectrum of state and local training audiences, thus promoting better hazardous materials planning by jurisdictions and facilities. The curriculum is organized into three training levels based on general skill requirements of the target audience: Planning Orientation, Planning Essentials, and Planning Specialties. These areas are briefly described below; more detailed information on each is presented in subsequent sections of the *Guidelines*.

Planning Orientation

The Planning Orientation curriculum area provides an introduction to hazardous materials planning, with an emphasis on the need for effective plans and the benefits to be derived. Instruction is designed to help individual students identify their roles and responsibilities in the planning process, and motivate them to participate fully and effectively as planning team members. Desired training competencies include an awareness level understanding of general hazardous materials planning concepts, processes, and legal requirements. No prerequisite knowledge of planning and emergency management concepts is assumed, and no skill development is attempted. Training should result in a positive attitudinal change and a general understanding of the planning function.

Planning Essentials

The Planning Essentials curriculum area provides participants with the knowledge and skills they need to develop a basic integrated hazardous materials emergency plan for a jurisdiction or facility. The primary training audience is local planning team members. Training objectives cover a broad range of general competencies, including the ability to function effectively in a team environment, assist in or conduct a basic hazards analysis and capability assessment, work with others to analyze options and draft sections of the plan, and participate in plan implementation, evaluation, and maintenance.

Planning Essentials addresses basic skills, with an emphasis on the student's ability to interpret and use information provided by various technical specialists in developing the plan. More advanced planning skills are covered in the Planning Specialties curriculum area, discussed below. Audience members are assumed to already possess training competencies covered in Planning Orientation and an expertise in the professional discipline that the student represents on the planning committee. Managerial, administrative, and logistic requirements for organizing the planning process, including staff recruitment and assignments, are not addressed.

Planning Specialties

Recognizing that many skills are needed to support the planning process above those involved in basic plan development, the Planning Specialties curriculum area has been organized to articulate additional, often more advanced learning competencies. State and local planning needs and training requirements will vary considerably in these specialty areas. Hence, the curriculum supports selective focused training by jurisdictions and facilities in only those specialty skill areas where training is needed at any given time.

The list of specialty areas included in the curriculum is intended to reflect the prevailing needs of state and local training organizations. It is anticipated that more specialty areas will be defined over time, and some may be eliminated or modified as needs change. Specialty skill training areas identified for the current edition of the *Guidelines* include the following:

- Commodity Flow Study
- Hazards Analysis
- Capability Assessment

- Planning for Protective Actions
- Plan Implementation and Maintenance
- Facility Planning
- Planning for Public Education

Content of the Guidelines

The following sections of the *Guidelines* identify training requirements for each major curriculum area: Planning Orientation, Planning Essentials, and Planning Specialties. These requirements are defined primarily in the form of terminal and enabling objectives that describe basic competencies needed by audience members to successfully perform related tasks. Narrative information describing the curriculum area, target audiences, subject matter content, and recommended training methodologies is included, as appropriate.

The training requirements described in this model support the tasks needed to produce comprehensive OSHA and SARA Title III plans and facility plans. They reflect the general planning philosophies and team approaches incorporated in FEMA and NRT guidance. As noted previously, the training requirements address a variety of audiences and needs. A challenge for state and local training managers will be to match the unique roles and responsibilities of personnel in their jurisdictions with the categories used in this model, or to tailor the model to meet their specific needs. Assistance in this general process will be addressed in the *Guidelines for Training Program Management* section of subsequent editions of this manual.

Hazardous Materials
Planning Training Guidelines

Planning Orientation

General Training Considerations

Introduction

The Planning Orientation curriculum area provides an introduction to hazardous materials planning, with an emphasis on the need for planning and the benefits to be derived. Instruction should to help individual students identify their roles and responsibilities in the planning process, and motivate them to participate fully and effectively as planning team members. Desired training competencies include an awareness level understanding of general hazardous materials planning concepts, processes, and legal requirements. No previous knowledge is assumed, and no skill development should be attempted. Training should result in a positive attitudinal change and the achievement of a general understanding of the planning function.

Audience

The primary training audience for Planning Orientation includes all potential participants in the hazardous materials planning process from jurisdictions, government and response agencies, community services organizations, private sector facilities and transporters, and other businesses and industries. Specifically included are elected and appointed officials, CEOs, program mangers, and others who are able to influence jurisdictional and organizational planning priorities and resources. In addition, training is encouraged for the broad spectrum of persons who have a "stake" in planning, i.e., they may be impacted by the results of planning, although they have no defined role in the actual development of emergency plans. Thus, audience members might include:

- Jurisdiction and facility planning team members
- LEPC and SERC members
- Local and state government officials, including elected and appointed
- Facility owners and managers
- Representatives of government and response agencies, including SOP writers
- Representatives of community support services and volunteer organizations
- Emergency responders and mitigation/prevention personnel
- Citizens in the impacted planning jurisdiction
- Special interest and advocacy groups
- Emergency program managers

Methodology Recommendations

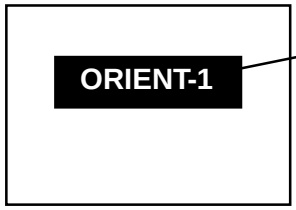
The typical training delivery format for Planning Orientation is a brief (one to four hours) presentation or seminar led by an experienced and dynamic facilitator. Whenever possible, the audience should include representatives from a broad range of organizations and disciplines, thereby promoting a heightened understanding of the diverse interests and requirements associated with hazardous materials planning. Since training should motivate and encourage attitudinal change, the use of presentation graphics and instructional media (slides, videotapes, etc.) is particularly appropriate. Other considerations include:

- Training must be tailored to audience needs, recognizing that some students may have no understanding of emergency management or the challenges associated with interdepartmental planning and coordination.
- When possible, training should permit group interactions and foster initial team building.
- Training experiences should be practical and constructive to promote positive attitudinal change. The discussion of hazardous materials threats, which is important to focus attention and clarify program need, should emphasize positive solutions through community and industrial planning and cooperation.
- Course materials should include local examples and issues to help generate interest and participation in local planning processes.
- Recruitment of students may be an issue due to lack of preexisting interest in the subject. "Teaser" programs and strategies to peak community interest and enrollment may be appropriate.

Recommended Training

Planning Orientation

The following instructional objectives describe student competencies recommended for orienting planning team members and others to the subject of hazardous materials planning. The legislative and regulatory basis for this training can be found primarily in the requirements specified in OSHA 1910.120 for development of employers' emergency response plan, SARA Title III for development of planning jurisdiction emergency response plans, and various federal agency regulations for development of facility and transporter emergency response plans. Sources for the material include the planning guidance in FEMA SLG 101, NRT-1, and other reference documents, the most important of which are described in the Appendices. The objectives are designed to be comprehensive, i.e., to address the training requirements of all identified audience members; thus, training developers and instructors will need to tailor these objectives to meet local audience interests, needs, and planning processes.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as ORIENT-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
ORIENT-1	Given a description of potential hazardous materials risks, explain the purpose and benefits of integrated hazardous materials emergency planning, and describe typical roles and participants in the emergency management system.
ORIENT-1.1	Describe the nature of the hazardous materials threat and associated risks for the government, industry, and community, including the relationship between natural and technological hazards.
ORIENT-1.2	Describe the purpose and benefits of a comprehensive and integrated approach to hazardous materials planning, including the relationships among plans, SOPs, and exercises.
ORIENT-1.3	Describe the roles and general responsibilities of federal, state, and local government agencies and private sector organizations in integrated hazardous materials preparedness, response, recovery, and mitigation/prevention.
ORIENT-2	Given a jurisdiction or facility with the need to develop an integrated hazardous materials plan, identify legal requirements impacting the planning process and product.

Recommended Training

ORIENT-2.1 Identify hazardous materials planning requirements for state and local jurisdictions contained in the following authorities:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended
- Title III of the Superfund Amendments Reauthorization Act (SARA)
- Hazardous Materials Emergency Planning Guide (NRT-1)
- OSHA 29 CFR 1910.120 and EPA 40 CFR

ORIENT-2.2 List legislation and regulations that affect facility planning requirements, including:

- EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)— 40 CFR part 112.7(d) and 112.20 to 112.21
- MMS's Facility Response Plan Regulation—30 CFR part 254
- RSPA's Pipeline Response Plan Regulation—49 CFR part 194
- USCG's Facility Response Plan Regulation—33 CFR part 154, subpart F
- EPA's Risk Management Programs Regulation—40 CFR part 68
- OSHA's Emergency Action Plan Regulation—29 CFR 1910.38(a)
- OSHA's Process Safety Standard—29 CFR 1910.119
- OSHA's HAZWOPER Regulation—29 CFR 1910.120
- EPA's Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, subpart D, 40 CFR part 265, subpart D, and 40 CFR part 279.52

ORIENT-2.3 Describe the characteristics and advantages of all-hazard planning and hazard-specific planning.

ORIENT-3 Given the assignment to conduct hazardous materials emergency planning, identify the scope and elements of an integrated hazardous materials emergency plan.

ORIENT-3.1 Define the scope (in terms of types of emergencies and functions to be addressed) of an integrated hazardous materials emergency plan for a jurisdiction or facility.

ORIENT-3.2 Identify the elements of an integrated hazardous materials emergency plan that are necessary to meet local, state, and federal requirements and guidelines.

ORIENT-4 Given the assignment to conduct hazardous materials emergency planning, identify and describe the major steps, participants, and other resources needed in the planning process.

Note: Various explanations of the planning process can be found in the literature, including those described in the Guide for All-Hazard Emergency Operations Planning (FEMA SLG 101), Hazardous Materials Emergency Planning Guide (NRT-1), Technical Guidance for Hazards Analysis (EPA/FEMA/DOT), Handbook of Chemical Hazard Analysis Procedures (FEMA/DOT/EPA), and Emergency Management Guide for Business & Industry (FEMA 141), and NRT's Integrated Contingency Plan Guidance. These approaches to planning, which are briefly described in Appendix B, incorporate the generic functional requirements of planning, although the steps and procedures may be defined somewhat differently. Jurisdictions and facilities should select and/or modify these models to best meet their unique planning needs and preferences.

ORIENT-4.1 Identify and describe the major steps in the planning process to be used.

ORIENT-4.2	Identify participants and other resources needed for the planning process.
ORIENT-5	Given an assignment to participate in or support integrated hazardous materials planning, develop strategies for promoting planning.
ORIENT-5.1	Describe the participant's role, responsibilities, and work requirements in the integrated hazardous materials planning process.
ORIENT-5.2	Identify related information and training needs, available resources, contacts, and possible obstacles or constraints.
ORIENT-5.3	Develop strategies for promoting planning.

Hazardous Materials
Planning Training Guidelines

Planning Essentials

General Training Considerations

Introduction

The Planning Essentials curriculum provides participants with the knowledge and skills they need to develop a basic integrated hazardous materials emergency plan for a jurisdiction or facility. The primary training audience is local planning team members. Training objectives cover a broad range of generic competencies, including the ability to function effectively in a team environment, assist in or conduct a basic hazards analysis and capability assessment, work with others to analyze options and draft sections of the plan, and participate in plan implementation, evaluation, and maintenance.

Planning Essentials covers basic skills, with an emphasis on the ability to interpret and use information provided by various technical specialists in developing the plan. More advanced planning skills are addressed in Planning Specialties. Audience members are assumed to already possess training competencies covered in Planning Orientation and an expertise in the professional discipline that the student represents on the planning committee. It is further assumed that managerial, administrative, and logistic requirements for organizing the planning process, including staff recruitment and assignments, have already been accomplished. The training competencies for senior management of the overall planning process are addressed separately in this guidance as a planning specialty area.

Audience

The training audience for Planning Essentials includes planning team members who have a defined responsibility in researching, preparing, implementing, and maintaining hazardous materials plans for jurisdictions or facilities. These persons generally represent their organization or functional specialty in an integrated planning process. Audience categories can be summarized as follows:

- For communities, training audiences may include local government emergency planners, SERC/LEPC and Area Committee members, hazardous materials officers and team leaders, emergency program managers, public sector agency representatives, community support services and volunteer organization representatives, and various technical specialists.

- For private sector facilities, audience members may include industry owners and executives, general planners, production/process managers, functional managers (e.g., communications, public information, emergency response, etc.), safety officers, technical experts, and others employed by the facility.

- Personnel who have responsibilities for reviewing and approving facility plans and/or enforcing compliance with existing community regulations and standards may also benefit by training.

Methodology Recommendations

It is recognized that the planning needs of different jurisdictions and facilities, and the resulting training needs of planning team members, can vary greatly, depending on such factors as geographic size, demographics, hazards, local resources, and political preferences. However, Planning Essentials is intended to address the generic training requirements of all hazardous materials planners. Training managers, course developers, and instructors may need to tailor materials to meet the unique needs and interests of different audiences, incorporating elements covered in Planning Specialties, as appropriate.

Training can typically be accomplished in two to four days of classroom instruction led by an experienced facilitator. Breaking training into modules (e.g., Hazards Analysis) that are delivered at different times is also possible, and this approach may be beneficial if timed to coincide with planning team assignments. However, team building is very important in the planning process, so continuity of student groupings throughout training is recommended. Other training considerations include the following:

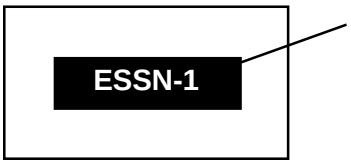
- Training should focus on the actual development of local plans, with the product and participation in the group planning process used to demonstrate student mastery of the objectives.
- Audience should be heterogeneous, reflecting the diverse community members and professional disciplines involved in the planning process. It is highly recommended that team members who will work together in subsequent planning efforts be trained together as a team.
- Course methodology should emphasize group interactions, team building, and resolution of interpersonal conflicts, as well as the development of the plan product itself.
- Course materials should be multi-tracked in terms of type of plan (OSHA, SARA, etc.) to facilitate tailoring the instruction to the needs of the audience.
- Instruction should include practical strategies for merging local plan requirements and needs (i.e. merging several plan requirements into one development effort) to foster more efficient planning efforts.
- Instruction should emphasize the need for on-going planning commitments by the team and the organizations they represent.
- Instruction should emphasize the need for ongoing evaluation at each step in the planning process.
- Instructors should emphasize that steps in the planning process, although taught sequentially, may actually be performed simultaneously.

Recommended Training

Planning Essentials

The following instructional objectives describe competencies recommended for training planning team members and others in the essentials of hazardous materials planning. The legislative and regulatory basis for this training can be found primarily in the requirements specified in OSHA 1910.120 for development of employers' emergency response plan, SARA Title III for development of planning jurisdiction emergency response plans, and various federal agency regulations for the development of facility and transporter emergency response plans. The objectives incorporate generic concepts and processes derived from various sources in the planning literature. Several of the most important reference documents, and more specific models for planning, are described in the Appendices. The objectives are intended to be comprehensive, i.e., to address the training requirements of all identified audience members; thus, training developers and instructors will need to tailor these objectives to meet local audience interests, needs, and planning processes.

Objective Identification Legend



This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as ESSN-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
ESSN-1	Given an assignment as a planning team member and an overview of the planning process to be used, describe an appropriate planning strategy and identify team member responsibilities in the process.

Recommended Training

ESSN-1.1	Describe the benefits of a team approach to planning and identify skills necessary to participate in the team planning process.
ESSN-1.2	Identify team members with related roles, coordination requirements, available resources, and administrative support systems.
ESSN-1.3	Describe roles of participants in the team planning process, to include organizational and/or functional areas of responsibility.
ESSN-1.4	Demonstrate an understanding of the planning process mission statement, goals, and objectives.
ESSN-1.5	Describe the expected results of the planning process, to include the plan format and time lines.
ESSN-2	Given a review of pertinent information sources and data collection methods, demonstrate the ability to identify, acquire and summarize background information related to individual organizational and/or functional area(s) of responsibility that will impact the team planning process.
ESSN-2.1	Demonstrate the ability to identify, gather, and review copies of policies, plans, and authorities (e.g., community Emergency Operations Plans, mitigation/prevention plans, response agency SOPs, facility plans, codes and ordinances, etc.).
ESSN-2.2	Demonstrate the ability to review critiques of actual incidents, exercises, and drills and identify issues to be addressed in the plan.
ESSN-2.3	Demonstrate the ability to review changes and trends impacting the jurisdiction, organization, or facility and identify issues to be addressed in the plan.
ESSN-2.4	Demonstrate the ability to interview managers, public officials, technical specialists, and practitioners in organizations affected by the plan and identify issues to be addressed in the plan.
ESSN-2.5	Identify, aggregate, and summarize related planning issues, priorities, concerns, and challenges.
ESSN-3	Given an assignment as a planning team member and an overview of the planning process to be used, identify and describe the purpose, benefits, major steps, and participant's role in Hazards Analysis & Capability Assessment.

ESSN-3.1	Explain the purpose, benefits, and major steps in conducting a Hazards Analysis.
ESSN-3.2	Explain the purpose, benefits, and major steps in conducting a Capability Assessment.
ESSN-3.3	Identify responsibilities in the Hazards Analysis & Capability Assessment processes, as appropriate.
ESSN-3.4	Describe the methods and expected results of the Hazards Analysis & Capability Assessment processes, including roles of various planning team members and technical specialists.
ESSN-4	Given an assignment as a planning team member and an overview of the planning process to be used, demonstrate the ability to identify, collect, review and interpret the Hazards Analysis & Capability Assessment data.
ESSN-4.1	Demonstrate the ability to collect or assist in collecting the data, as required.
ESSN-4.2	Demonstrate the ability to review and interpret the data.
ESSN-4.3	Demonstrate the ability to identify, map, and prioritize hazards, risk areas, and vulnerable zones, and identify capability shortfalls and excesses (gap analysis).
ESSN-5	Given an assignment as a planning team member and the results of research and input from other planning team members, describe the issues and solutions to be addressed in the plan and identify needed assignments for developing the plan.
ESSN-5.1	Describe issues and solutions to be addressed in the plan by examining existing plans, Hazards Analysis results, Capability Assessment results and other pertinent information.
ESSN-5.2	Identify plan development tasks to be assigned to planning team and other organizational representatives.
ESSN-6	Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating the Integrated Hazardous Materials Emergency Plan, to address preparedness, response and short term recovery.
ESSN-6.1	Identify the planning elements necessary to comply with regulatory requirements, standards, and guidelines.

Recommended Training

ESSN-6.1.1	If developing or updating a jurisdictional plan, describe format guidelines specified in SLG-101 and NRT-1.
ESSN-6.1.2	If developing or updating a facility or organization plan, describe format guidelines specified in the NRT's Integrated Contingency Plan guidance.
ESSN-6.2	Demonstrate the ability to develop or update the plan to meet the required regulatory elements.
ESSN-7	Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating a comprehensive prevention/mitigation section in the plan.
ESSN-7.1	Identify prevention/mitigation strategies and techniques to address the identified issues and solutions.
ESSN-7.2	Demonstrate the ability to write the plan to meet all identified prevention/mitigation planning needs.
ESSN-8	Given a completed draft hazardous materials plan, demonstrate the ability to participate in the plan review and appraisal process.
ESSN-8.1	Identify the purpose and benefits of reviewing the plan.
ESSN-8.2	Demonstrate the ability to conduct an internal draft plan review to assess adequacy and completeness.
ESSN-8.3	Demonstrate the ability to facilitate an external review of the draft plan, which may include peer review, management review, community input, and state/federal review.
ESSN-8.4	Demonstrate the ability to make necessary revisions, and promote formal plan promulgation.
ESSN-9	Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for implementing the plan.
ESSN-9.1	Identify the purpose and benefits of conducting plan implementation.

ESSN-9.2	Identify roles and responsibilities for plan implementation, to include available resources, administrative systems, and time lines.
ESSN-9.3	Describe the strategy and methods for plan implementation, to include: · Disseminating copies of the plan · Briefing and orienting users of the plan · Coordinating the plan with other planning efforts · Coordinating the plan with other training efforts
ESSN-10	Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for evaluating and maintaining the plan.
ESSN-10.1	Identify the purpose and benefits of conducting plan evaluation and maintenance.
ESSN-10.2	Identify roles and responsibilities for plan evaluation and maintenance.
ESSN-10.3	Describe the strategy and methods for plan evaluation and maintenance, to include: · Monitoring changes, trends, and actual events impacting the plan · Developing, conducting, and evaluating exercises and drills · Periodically updating and revising the plan

Hazardous Materials
Planning Curriculum Guidelines:

Planning Specialties Introduction

Introduction

Introduction

Recognizing that many skills are needed to support the planning process beyond those involved in basic plan development, the Planning Specialties curriculum has been organized to articulate additional, often more advanced learning competencies. It is anticipated that state and local planning needs and training requirements will vary considerably in these specialty areas. Hence, the curriculum supports selective focused training by jurisdictions in only those specialty skill areas where training is needed at any given time.

The list of specialty areas included in the curriculum is intended to reflect the prevailing needs of state and local training organizations. It is anticipated that more specialty areas will be defined over time, and some may be eliminated or modified as needs change. Specialty skill training areas identified for the current edition of the *Guidelines* include the following:

- Commodity Flow Study
- Hazards Analysis
- Capability Assessment
- Planning for Protective Actions
- Plan Implementation and Maintenance
- Facility Planning
- Planning for Public Education

Other topics planned or under discussion include Organizing the Planning Process, Planning Information Management, Exercising the Plan, SOP Writing, Illicit Use of Hazardous Materials, Liability Issues in Hazardous Materials, Marketing the Plan, and Public Information/Education Programs. Recommendations or feedback on the selection of topic areas for inclusion in future editions of the *Guidelines* should be directed to William Lewis, Emergency Management Institute, FEMA.

Audience:

The training audience for the Planning Specialties curriculum includes jurisdiction and/or facility hazardous materials planning team members that have been assigned responsibilities requiring advanced level knowledge and skills, i.e., exceeding that needed to develop a basic plan as defined in Planning Essentials. Included are representatives of local government and response agencies, community services organizations, private sector facilities and transporters, and other businesses and industries. Since audience members will vary somewhat according to the topic, they are defined in more detail for each specialty area. However, a generic listing might include:

- Jurisdiction and facility planning team members
- LEPC and SERC members
- Facility owners and managers
- Representatives of government and response agencies
- Representatives of community support services and volunteer organizations
- Mitigation/prevention personnel
- Consultants and technical experts
- Emergency program managers

Methodology Recommendations

The typical training delivery format for Planning Specialties is a one to two day course led by an experienced instructor. However, more or less time may be appropriate, depending on the subject area, degree of complexity, and related planning requirements. Training managers may also wish to combine Planning Specialties modules for audiences that need training in more than one area, or add one or more modules to Planning Essentials. Other training considerations include the following:

- Audience members are assumed to already possess basic competencies in hazardous materials plan development. Otherwise, experience and expertise among audience members may vary significantly.
- Training should be tailored to audience needs, focusing on the specific jurisdiction's or facility's planning requirements and individual assignments in the planning process.
- Course materials should include local examples, and activities should be based on local issues and data to the extent possible.
- Where local teams are conducting complex studies, members should be trained concurrently, and training should permit group interactions and foster team building.

More information on training scope, audiences, and appropriate methodologies is presented on subsequent pages for each specialty topic area.

Hazardous Materials
Planning Curriculum Guidelines:

Commodity Flow Study

General Training Considerations

Scope/Objectives of Training

Most communities, whether large or small, are origins, destinations, or through-routes for hazardous materials transportation. In order to plan and prepare for possible hazardous materials incidents, planners need basic data on the types and quantities of chemicals transported through the jurisdiction. The process of acquiring and analyzing this information, referred to here as a commodity flow study, is one of the first steps in preparing a community's integrated hazardous materials emergency plan. Results can be used to analyze current traffic patterns, focus planning efforts on existing needs, and reduce the potential for incidents to occur.

This training specialty area builds on Planning Essentials competencies to provide participants with the knowledge and skills they need to prepare a simple commodity flow study. Content areas covered by training should include the purpose and benefits of conducting commodity flow studies, an overview of appropriate data collection methods, generic steps in the process, related statistical concepts, and sources of additional assistance and information. Where appropriate, more specific models and procedures followed by the jurisdiction can be introduced. Applications and limitations of the study results in the planning process should also be reviewed.

Audience

Potential training audiences include all participants in the planing process that have been assigned responsibility for conducting a commodity flow study that exceeds the competencies covered under Planning Essentials. Possible audience members include:

- • Community planning team members
- Facility planners and managers
- Response agency representatives
- Prevention personnel, transport inspectors
- Technical experts and consultants

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students are assumed to possess Planning Orientation and Planning Essentials levels of competency in hazards analysis and related skills. Consideration should be given to students that have a defined responsibility for conducting a commodity flow study for a jurisdiction as a regular part of their job.

Typical Program Format

Seminar-type instructor-led program, approximately one to two days in length. Longer programs may be appropriate where more complex commodity flow studies are planned or when actual field surveys are included as training activities.

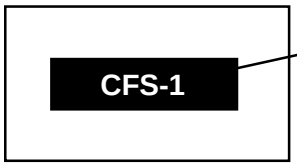
Methodology and Training Delivery Considerations

Training should provide students with knowledge of the steps and components of a generic commodity flow study, and skill in performing various data collection methods. Trainees must understand the significance and application of commodity flow study information, and develop the ability to recognize and develop useful and meaningful data on which to base subsequent emergency operations and prevention programmatic and organizational decisions.

Much of the subject matter in this specialty area can be introduced through self-study, but training should include formal classroom instruction with time spent in individual and small group work. Activities should focus on skill development in identifying, collecting, and interpreting various types of commodity flow data, and in using this information in the planning process. Limited field surveys, reviews of shipping papers, role plays of driver interviews, etc. are particularly appropriate for promoting learning. Realistic local situations and scenarios should be used as the basis for activities, when possible.

Recommended Training

Integration of the information learned by trainees can be demonstrated in a post-class activity involving the development of a limited commodity flow study based on data from the jurisdiction or scenarios provided by the instructor. For this reason, members of jurisdictional planning teams should be trained together, if possible, using the planned study as the basis for activities. Content testing is appropriate for demonstrating knowledge of the steps involved in a commodity flow study and methods of data collection.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as CFS-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
CFS-1	Given a jurisdiction with the need to develop an integrated hazardous materials emergency plan, describe the purpose and benefits of conducting a commodity flow study, including appropriate applications of the results in planning.
CFS-1.1	Describe the purpose and benefits of conducting a commodity flow study in hazardous materials planning.
CFS-1.2	Describe appropriate applications of the results of commodity flow studies in hazardous materials planning.
CFS-2	Given an assignment to conduct a commodity flow study for a jurisdiction, identify major steps in the process, such as the following: (1)Identify the specific purpose(s) of the study. (2)Review baseline information appropriate to the study. (3)Design the study. (4)Conduct field surveys. (5)Analyze the results. (6)Apply the results to the study purpose and objectives.
CFS-3	Given an assignment to conduct a commodity flow study for a jurisdiction, identify the specific purpose(s) of the study.
CFS-3.1	Assess the emergency management needs and other possible applications and uses for hazardous materials transportation data in the jurisdiction.
CFS-3.2	Identify the specific types of hazardous materials transportation data needed for the study.

Recommended Training

CFS-4	Given the specific purpose(s) of a commodity flow study for a jurisdiction, demonstrate the ability to identify and review existing baseline information appropriate to the study.
CFS-4.1	Describe common sources of existing information that can be used to identify roads available to hazardous materials transportation.
CFS-4.2	Describe common sources of existing information on vehicle traffic patterns, chemical flows, and accident histories in the jurisdiction.
CFS-5	Given the specific purpose(s) and baseline data of a commodity flow study for a jurisdiction, demonstrate the ability to design a field investigation appropriate to the study.
CFS-5.1	Compare baseline information with project goals to determine whether a field investigation should be undertaken.
CFS-5.2	Identify options and considerations for determining survey locations.
CFS-5.3	Identify options and considerations for determining survey times and repetitions.
CFS-5.4	Identify the personnel and other resource requirements associated with selected field survey methods.
CFS-6	Given an area to be surveyed and the commodity flow study design for a jurisdiction, demonstrate the ability to implement common data collection methods.
CFS-6.1	Describe common methods and demonstrate the appropriate use of placard surveys.
CFS-6.2	Describe common methods and demonstrate the appropriate use of shipping papers reviews.
CFS-6.3	Describe common methods and demonstrate the appropriate use of driver interviews.
CFS-6.4	Describe common methods and demonstrate the appropriate use of facility surveys.
CFS-6.5	Describe the advantages and disadvantages of various data recording procedures that can be used in field surveys.
CFS-7	Given hazardous materials transportation data for a jurisdiction, demonstrate the ability to apply appropriate sampling techniques to the collection and interpretation of the data.
CFS-7.1	Describe key statistical concepts (e.g., Poisson distribution, expected and observed value, confidence intervals) relevant to traffic flow analysis.
CFS-7.2	Make appropriate conclusions and inferences based on sample characteristics and collected data.

Recommended Training

CFS-8	Given hazardous materials transportation data and analyses for a jurisdiction, demonstrate the ability to apply the results in planning.
CFS-8.1	Map or otherwise display and report the results of the commodity flow study to obtain a clear picture of hazardous materials transportation in the jurisdiction.
CFS-8.2	Compare the study results and project goals to identify action items and a schedule for implementing them through the jurisdiction's plan development and implementation process.

Hazardous Materials
Planning Curriculum Guidelines:

Hazards Analysis

General Training Considerations

Scope/Objectives of Training

A hazards analysis includes (1) identifying hazards associated with the storage, handling, processing and transportation of hazardous materials, (2) conducting a vulnerability analysis to identify people, property, and environments susceptible to damage should a hazardous materials release occur, and (3) conducting a risk analysis to determine the probability of various types of emergencies and estimates of resulting damage.

Training should provide the knowledge and skills necessary to conduct a comprehensive hazards analysis for a jurisdiction or facility. Skill development should include the ability to assess the jurisdiction's or facility's hazards analysis needs, determine appropriate methods, collect and interpret data, and report the results. Specifically included is the use of tables and other tools for determining the level of concern, establishing hazard and vulnerability zones, and identifying related priorities. More sophisticated and technical approaches to hazards analysis may also be covered, if appropriate, or references provided for additional training and assistance.

Audience

Potential training audiences are all participants in the planing process that have been assigned responsibility for conducting a hazards analysis that exceeds the competencies covered under Planning Essentials. Possible audience members include:

- Community planning team members
- Facility planners and managers
- Response agency representatives
- Prevention personnel
- Technical experts and consultants

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students are assumed to possess Planning Orientation and Planning Essentials levels of competency in hazards analysis. Consideration should be given to students that have a defined responsibility for conducting higher level hazards analyses for a jurisdiction or facility as a regular part of their job.

Typical Program Format

Seminar-type instructor-led program, approximately one to two days in length. Longer programs may be appropriate where more complex studies are planned or when actual field surveys are included as training activities. Training managers may wish to combine this instruction with a module on capability assessment for audiences that perform both tasks.

Methodology and Training Delivery Considerations

The successful accomplishment of training objectives should result in enhanced student proficiency in applying the principles of hazards analysis to a specific jurisdiction's or facility's planning needs and processes. Training should focus on developing knowledge of the steps and components of hazards analysis and on developing skill in performing hazard identification, vulnerability analysis, and risk analysis. Trainees must understand the significance and application of hazards analysis information, and develop the ability to recognize and develop useful and meaningful data on which to base subsequent emergency operations planing and prevention programmatic and organizational decisions.

Much of the content for analyzing hazards can be introduced through self-study, but training should include formal classroom instruction with significant time spent in individual and small group work. Activities should focus on skill development in extracting hazard identification and vulnerability information from available data sources, determining vulnerable zones from maps and hazard data, and performing the analyses leading to accurate risk determination. Content testing is appropriate for demonstrating knowl-

edge of the steps involved in hazards analysis, listing types of hazard information, and identifying the components of a completed hazards analysis.

Because of the interdisciplinary nature of planning and hazards analysis, training audiences should be heterogeneous and, whenever possible, small-group work should be conducted to encourage cross-disciplinary interactions. Integration of the information learned by the trainee can be demonstrated in a post-class activity involving the development of a limited hazards analysis using data from the trainee's home jurisdiction or facility, or scenarios provided by the instructor. Members of planning teams that are conducting a complex hazards analysis should be trained together, if possible, with student activities based on assignments.

Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as HAZAN-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
HAZAN-1	Given an assignment to conduct a hazards analysis for a jurisdiction or facility, describe the process to be used for conducting the study.
HAZAN-1.1	Describe the purpose and benefits of conducting a hazards analysis, including appropriate applications of the results in planning.
HAZAN-1.2	Describe the basic steps in a hazards analysis (hazards identification, vulnerability analysis, risk analysis).
HAZAN-1.3	Identify types and sources of information commonly used in hazards analysis.
HAZAN-2	Given an assignment to conduct a hazards analysis for a jurisdiction or facility, demonstrate the ability to identify hazards and situations that pose a serious threat in the planning area.
HAZAN-2.1	Describe the process and data sources to be used for hazards identification.
HAZAN-2.2	Identify the location of hazardous materials facilities and major transportation routes within the planning area.
HAZAN-2.3	Identify the types, quantities, and specific locations of hazardous materials used by facilities within the planning area.

Recommended Training

HAZAN-2.4	Identify the types and quantities of hazardous materials transported in or through the planning area.
HAZAN-2.5	Assess the storage conditions of hazardous materials in the planning area (e.g., containment, packaging, security, release detection).
HAZAN-2.6	Identify the nature of hazards (e.g., flammable, explosive, toxic) most likely to accompany hazardous materials spills or releases.
HAZAN-3	Given the results of the hazard identification, demonstrate the ability to analyze and map the vulnerability of people, property, business interests, and environments in the planning area.
HAZAN-3.1	Describe the process and data sources to be used for vulnerability analysis.
HAZAN-3.2	Identify methods to screen and prioritize hazards for more in-depth analysis.
HAZAN-3.3	Identify the level of concern for chemical hazards.
HAZAN-3.4	Estimate the credible worst-case scenario for hazardous materials threats.
HAZAN-3.5	Determine the extent of vulnerable zones for identified hazards using worst-case scenarios.
HAZAN-3.6	Map vulnerable zones, and identify conditions that influence the zone of impact.
HAZAN-3.7	Identify susceptible human populations, property, business interests, and environments in the vulnerable zone, including high-risk populations, critical facilities, and sensitive environments.
HAZAN-4	Given a hazard identification and vulnerability analysis for a community or facility, demonstrate the ability to assess the risk of injury or damage due to a hazardous materials release in the planning area.
HAZAN-4.1	Describe the process and data sources to be used for risk assessment.
HAZAN-4.2	Estimate the probability of occurrence of worst-case scenarios, and describe unusual conditions, such as the possibility of simultaneous incidents.
HAZAN-4.3	Assess community and facility safeguards, response capabilities in place, and incident histories (as necessary).
HAZAN-4.4	Describe the type of harm to human populations and damage to property, business interests, and environments expected in worst-case situations.
HAZAN-4.5	Categorize, prioritize, and/or rank hazards for planning, as appropriate.

HAZAN-5	Given the hazard identification, vulnerability analysis, and risk assessment for a community or facility, demonstrate the ability to prepare a comprehensive hazard analysis report.
HAZAN-5.1	Identify and describe hazards and related conditions in the planning area.
HAZAN-5.2	Describe the vulnerability of populations, property, business interests, and environments to hazardous materials threats in the planning area.
HAZAN-5.3	Describe the risk of injury and/or damage from hazardous materials incidents in the planning area, and prioritize risks for planning, as appropriate.

Hazardous Materials
Planning Curriculum Guidelines:

Capability Assessment

General Training Considerations

Scope/Objectives of Training

A capability assessment provides information designed to help the planning team evaluate preparedness, prevention, and response resources and capabilities. It includes an assessment of fixed site business and industry resources, transportation resources, and community (response and government agency) resources that could be called upon in the event of a potential emergency identified in the jurisdiction's or facility's hazards analysis.

Training should provide the knowledge and skills necessary to conduct a capability assessment for a jurisdiction or facility. Skill development should include the ability to assess the jurisdiction's or facility's capability assessment needs, determine appropriate methods, collect and interpret data, and report the results. Specifically included is the use of checklists, criteria, surveys, and other methods to identify available resources, determine requirements for accessing them, evaluate deficiencies in existing plans and procedures, and assess the effectiveness of emergency response, prevention, and recovery efforts. The successful accomplishment of training objectives should result in enhanced student proficiency in applying general principles of capability assessment to specific jurisdiction or facility planning needs and processes.

Audience

Potential training audiences include all participants in a jurisdiction or facility planing process that have been assigned responsibility for conducting a capability assessment study. Possible audience members include:

- Community planning team members
- Facility planners and managers
- Response agency representatives
- Prevention personnel
- Technical experts and consultants

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students are assumed to possess Planning Orientation and Planning Essentials levels of competency in capability assessment. Consideration should be given to students that have a defined responsibility for conducting a higher level capability assessment as a regular part of their job for a jurisdiction or facility.

Typical Program Format

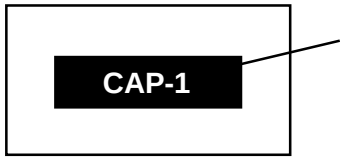
Seminar-type instructor-led program, approximately one to two days in length. Longer programs may be appropriate where more complex studies are planned or when actual field surveys are included as training activities. Training managers may wish to combine this instruction with a module on hazard analysis for audiences that perform both tasks.

Methodology and Training Delivery Considerations

Training should focus on providing knowledge of the steps and components of a comprehensive capability assessment and on developing related skills. Trainees must understand the significance and application of capability assessment information, and develop the ability to recognize and develop useful and meaningful data on which to base subsequent emergency operations planing and prevention programmatic and organizational decisions.

Much of the content for assessing capabilities can be introduced through self-study, but training should include formal classroom instruction with significant time spent in individual and small group work. Activities should focus on skill development in extracting capability assessment information from available data sources, identifying and assessing existing resources, assessing the effectiveness of emergency management activities, and identifying and evaluating planning shortfalls.

Integration of the information learned by the trainee can be demonstrated in a post-class activity involving the development of a limited capability assessment based on the hazards analysis and resource data from the trainee's home jurisdiction or facility, or from scenarios provided by the instructor. Content testing is appropriate for demonstrating knowledge of the steps involved in capability assessment, listing types of community and facility resources, and identifying the components of a completed capability assessment.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as CAP-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
CAP-1	Given an assignment to conduct a capability assessment for a jurisdiction or facility, describe the process to be used for conducting the study.
CAP-1.1	Describe the purpose and benefits of conducting a capability assessment, including appropriate applications of the results in planning.
CAP-1.2	Describe the advantages and disadvantages of alternative methods for conducting the capability assessment (checklists, criteria, surveys, expert panels, etc.).
CAP-1.3	Identify specific types and sources of information needed to conduct the capability assessment.
CAP-2	Given the process to be used for conducting a capability assessment for a jurisdiction or facility, assess the adequacy of existing resources to support preparedness, prevention/mitigation, response, and short-term recovery activities.
CAP-2.1	Determine the type, amount, capabilities, and accessibility of existing facility resources.
CAP-2.2	Determine the type, amount, capabilities, and accessibility of existing transporter resources.
CAP-2.3	Determine the type, amount, capabilities, and accessibility of existing community resources.
CAP-3	Given hazardous materials plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prepare for, respond to, and recover from worst-case incidents identified in the hazard analysis.

Recommended Training

CAP-3.1	Evaluate response issues and concerns identified through surveys and reviews of hazardous materials incident critiques, exercises, and drills.
CAP-3.2	Assess the adequacy of the jurisdiction's or facility's concept of operations, including roles and functional assignments, for responding to and recovering from worst-case incidents.
CAP-3.3	Assess the adequacy of existing resources for implementing the concept of operations in worst-case incidents.
CAP-3.4	Assess the adequacy of organizational policies and SOPs for implementing the concept of operations in worst-case incidents.
CAP-3.5	Assess the level of competency of emergency personnel to respond in worst-case incidents identified in the hazard analysis..
CAP-4	Given hazardous materials plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prevent or mitigate the effects of identified risks.
CAP-4.1	Evaluate prevention issues and concerns identified through surveys or reviews of hazardous materials incident critiques, exercises, and drills.
CAP-4.2	Assess the adequacy of prevention measures, including roles and functional assignments, for preventing or mitigating the effects of identified risks.
CAP-4.3	Assess the adequacy of existing resources for implementing necessary prevention measures.
CAP-4.4	Assess the adequacy of organizational policies and SOPs for implementing necessary prevention measures.
CAP-4.5	Assess the level of competency of prevention personnel to implement necessary prevention measures.
CAP-5	Given the results of the capability assessment analysis, prepare a comprehensive written report.
CAP-5.1	Describe preparedness, mitigation/prevention, response, and short-term recovery capability shortfalls identified in the analysis.
CAP-5.2	Identify additional resources that may be needed to prepare for, prevent/mitigate, respond to, and recover from worst-case hazardous materials incidents.
CAP-5.3	Describe deficiencies in community and/or facility safety plans and procedures identified in the analysis, and recommend modifications, as appropriate. .

Hazardous Materials
Planning Curriculum Guidelines:

Planning for Protective Actions

General Training Considerations

Scope/Objectives of Training:

Planning for protective actions addresses policy and procedures for providing personal protection to the public, including protection in place and evacuation. Considerations include public education, alert and warning systems, the availability of appropriate shelter, the nature and duration of hazardous materials releases, traffic flow and control, reception and care facilities, health and medical services, protection of water and sewage systems, ongoing incident assessment, and other emergency response functions and capabilities.

Training should provide a working knowledge of the benefits and limitations of various protection strategies, including evacuation, in-place protection, and a combination thereof. Participants should gain an understanding of the need for protective action planning and important planning considerations. They should develop the ability to implement a decision-making process for any given hazardous materials emergency situation and protective action option, and learn strategies and techniques for communicating the desired protection action to the general public to elicit the best possible response.

Plans for protective actions must address roles, strategies, and procedures for a broad range of emergency preparedness and response activities. Depending on the jurisdiction's or facility's needs, planning may involve very complex analyses, decisions, and negotiations that must be addressed before incidents occur. Therefore, the goal of training is to give participants the knowledge and skills they need to assess existing capabilities in this area, identify needed resources, and establish systems for promoting effective response in any realistic hazardous materials incident scenario.

Audience:

The training audience includes decision makers, planning team members, SOP writers, and agency and organization representatives with responsibilities related to mass care and protective actions in hazardous materials emergencies. Possible audience members include:

- Community planning team members
- Local Emergency Planning Committees
- Government and response agency representatives
- Facility planners and managers
- Community support services and volunteer group representatives
- Incident Commanders
- Public Information Officers
- Warning Officers
- Emergency Management Officials

Prerequisites or Presumed Knowledge/Skills of Students:

Students should have mastered basic skills in hazardous materials planning, and have assigned responsibilities for hazardous materials emergency planning for a jurisdiction or facility. They should understand basic concepts of the Incident Command System, public relations and education, and emergency information and warning.

Typical Program Format:

An instructor-facilitated one to two day program with lecture/discussion, student and/or tabletop exercises, and case study reviews. Longer programs may be appropriate where more complex studies, student activities, and field work are planned.

Methodology and Training Delivery Considerations:

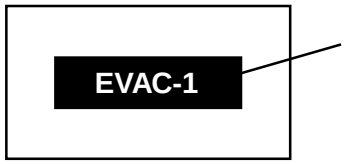
Planning for protective actions requires knowledge and skills in a broad range of disciplines and emergency response functions. Typically, many different government agencies, community organizations, and private sector groups are assigned related responsibilities under the emergency plan. For these reasons, the use of planning teams is particularly suited for this type of planning. Whenever possible, planning teams should be trained together to promote information sharing, inter-organizational understanding, and cooperation. Other considerations include:

- The training competencies identified for this curriculum area assume that a comprehensive hazards analysis and capability assessment have been completed for the jurisdiction or facility. If this assumption is incorrect, training managers may wish to incorporate additional competencies from other planning specialty areas in the instruction.

- Instructional content should stress the interrelationships among planning processes, prepared ness activities, response actions, and the public information and education components of emergency management.

- Training methodologies should emphasize small group interactions among various participants in the planning process. Hazardous materials incident case examples should be incorporated into the course, using student activities or tabletop exercises to promote and evaluate skill/ learning objectives.

- An instructional cadre concept, emphasizing diverse organizational interests and expertise, is particularly appropriate for this type of training.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as EVAC-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
EVAC-1	Given a hazards analysis and capability assessment for a jurisdiction or facility, demonstrate the ability to develop decision-making criteria for implementing protective actions.
EVAC-1.1	Describe the purpose and benefits of various protective action strategies, including evacuation, in-place sheltering, water supply protection, sewage system protection, and relocation.
EVAC-1.2	Compare the advantages and disadvantages of evacuation and in-place protection options for mass care in hazardous materials emergencies.

Recommended Training

EVAC-1.3 Identify factors to consider in selecting a protective action strategy in a hazardous materials emergency situation, including:

- The nature of the threat
- The population at risk
- Time factors involved
- Weather conditions
- Communications
- Response capabilities

EVAC-1.4 Identify and assess resources available for implementing various protective actions, including capabilities of organizations assigned related responsibilities under the plan.

EVAC-1.5 Develop decision-making criteria for implementing protective actions that address evacuation (precautionary, general, and selective), in-place sheltering, and other options in emergency situations identified in the hazards analysis.

EVAC-2 Given the assignment to plan for protective actions for a jurisdiction or facility, demonstrate the ability to assess existing systems, strategies, and procedures for notifying, warning, and informing the public about protective action decisions.

EVAC-2.1 Identify factors that influence the public's understanding of and response to protective actions in hazardous materials emergencies.

EVAC-2.2 Assess existing public education programs for informing the public about protective actions in the event of a hazardous materials emergency, including citizen roles and responsibilities.

EVAC-2.3 Assess existing warning and emergency public notification systems for implementing protective actions in a hazardous materials emergency.

EVAC-3 Given a hazards analysis and capability assessment for a jurisdiction or facility, demonstrate the ability to assess existing systems, strategies, and procedures for evacuating populations at risk in a hazardous material incident.

EVAC-3.1 Identify eight considerations when planning an evacuation, as follows:

(1)Emergency scene access and evacuation routes
(2)Areas of responsibility
(3)Geographical area, size and type
(4)Evacuation area
(5)Weather conditions
(6)Transportation
(7)Resisters
(8)Mass care centers and shelters

EVAC-3.2 Identify four constraints to an effective evacuation, as denoted in the Hans and Sells Study conducted for the U.S. Environmental Protection Agency, as follows:

(1)Time delay
(2)Notification time
(3)Mobilization time
(4)Travel time

EVAC-3.3	Identify six steps for implementing the evacuation process, as follows: (1)Form work groups (2)Track personnel assignments (3)Use map coordinates for making assignments (4)Issue evacuation warnings (5)Identify relocation shelters (6)Use the three-phase notification process
EVAC-3.4	Assess systems, strategies, and procedures for moving people out of risk areas (availability of vehicles, evacuation routes and alternatives, controlling traffic, special populations, etc.)
EVAC-3.5	Assess preparedness for reception and care of evacuees (shelter locations, supplies, notifying family members, health and medical care, mutual aid agreements, etc.)
EVAC-3.6	Assess decision-making criteria and procedures for re-entry after an evacuation.
EVAC-4	Given a hazards analysis and capability assessment for a jurisdiction or facility, demonstrate the ability to assess existing systems, strategies, and procedures for implementing in-place sheltering and other protective actions in a hazardous materials incident.
EVAC-4.1	Assess systems, strategies, and procedures for initiating and implementing in-place protection.
EVAC-4.2	Assess systems, strategies, and procedures for initiating and implementing water supply protection.
EVAC-4.3	Assess systems, strategies, and procedures for initiating and implementing sewage system protection.
EVAC-4.4	Assess systems, strategies, and procedures for monitoring toxic releases, continually assessing the potential for injury and damage, notifying the public as necessary, and terminating response activities.
EVAC-5	Given an assessment of the jurisdiction's or facility's capabilities to implement protective action options in hazardous materials incidents, demonstrate the ability to develop related emergency plans and procedures.
EVAC-5.1	Describe potential problems and capability shortfalls for implementing protective actions in worst-case hazardous materials incidents.
EVAC-5.2	Identify additional resources that may be needed to prepare for and implement protective actions in worst-case hazardous materials incidents.
EVAC-5.3	Identify recommended changes to hazardous materials emergency plans (addressing, for example, sections on the concept of operations, roles and responsibilities, direction and control, warning systems and emergency public notification, resource management, health and medical, personal protection of citizens, ongoing incident assessment, and human services).
EVAC-5.4	Describe modifications to jurisdiction and/or facility policies and procedures that are required to facilitate the recommended plan changes.

Hazardous Materials
Planning Curriculum Guidelines:

Plan Implementation and Maintenance

General Training Considerations

Scope/Objective of Training

Training in this curriculum area will provide students with the knowledge, skills, and practical tools they need to successfully implement a completed hazardous materials response plan, anticipate future outcomes, monitor and evaluate the plan's effectiveness, and revise it as appropriate to improve the jurisdiction's or facility's emergency operations and prevention/mitigation capabilities. Instruction builds on Planning Essentials competencies to help participants develop the feedback loop necessary for long-term plan maintenance and enhancement.

The content of training addresses (1) plan implementation, including promulgation and dissemination of the plan, orientation of plan users, and integration of multi-jurisdictional planning efforts; (2) validation of the plan, including methods of plan review, plan testing, and exercising; and (3) plan maintenance, including development of strategies and processes to identify, illuminate, and correct problems with the plan. Other subject areas potentially include environmental scanning, management audits, performance audits, and other long-term and strategic planning concepts.

Training focuses on the role of the planning manager or administrator in establishing systems and strategies for plan implementation and maintenance. This person may also participate in (and need training in) the actual writing and development of the plan, as defined in Planning Essentials and other Planning Specialties areas. Furthermore, the planning manager or administrator may function as the jurisdiction's or facility's Exercise Manager/Officer. However, advanced competencies in exercise design and development will be covered in a separate Planning Specialty area in subsequent editions of these *Guidelines*.

Audience

The training audience includes all personnel involved in the implementation, validation, and maintenance of a completed hazardous materials plan for their respective jurisdiction or facility. Audience members potentially include planners and decision makers for agencies and organizations represented in the plan, community leaders, and others interested in improving hazardous materials preparedness. Possible audience members are:

- Community planning team members
- Local Emergency Planning Committee members
- Government and response agency representatives
- Facility planners and managers
- Community support services and volunteer group representatives
- Exercise program managers and exercise officers
- Emergency Management Officials

Prerequisites or Presumed Prior Knowledge/Skills of Students

Students should possess Planning Orientation and Planning Essentials competencies and previous experience in community or organizational planning. They should have job responsibilities directly related to the management and administration of hazardous materials plans and planning processes for a jurisdiction or facility.

Typical Program Format

One to two days of classroom instruction with an emphasis on activities designed to help students develop strategies and mechanisms to assess, evaluate, and refine existing hazardous materials plans. Job aids to facilitate later work may be desirable. Training program managers may wish to combine this instruction with more in-depth materials on exercise design and development for audiences that perform both roles.

Methodology and Training Delivery Considerations

- Ideally, training audiences should be heterogeneous, reflecting the wide range of personnel involved in the integrated hazardous materials planning process. If possible, individuals who work together as members of a planning team should be trained together.

- Training methodologies should emphasize small group interactions and practical activities based on actual plans and realistic situations. Since teamwork and continuity are important in plan implementation and maintenance, it is recommended that student groupings be maintained throughout training.

- Generic case studies or scenarios should be available for use with audiences from diverse communities and organizations. The instructor should be able to flexibly tailor, update, or substitute these materials, depending on audience needs.

- Training emphasizes skills and attitudes needed for students to become effective long-term community change agents. Emphasis will be placed on methods and techniques for effecting meaningful change.

Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as PI&M-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
PI&M-1	Given the goals and objectives of the integrated hazardous materials planning process for a jurisdiction or facility, develop a strategy for plan implementation.
PI&M-1.1	List organizations and key personnel who should participate in plan implementation, including: • Planning team members • Organizations, groups, and facilities assigned responsibilities under the plan • Local, state, and federal oversight agencies • Community support services organizations affected by the plan
PI&M-1.2	Establish objectives for plan review and validation as part of the plan development process.
PI&M-2	Given a completed integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure proper promulgation and dissemination of the plan.

Recommended Training

PI&M-2.1	Identify the steps necessary to ensure proper promulgation of the plan.
PI&M-2.2	Determine the information needs of various groups, and develop strategies to orient them to their roles and assignments under the plan.
PI&M-2.3	Develop strategies to orient the public on the plan, including clarifying technical information as necessary to promote public understanding.
PI&M-3	Given an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure coordination with multi-jurisdictional planning efforts.
PI&M-3.1	Identify and assess options for coordinating and integrating the plan within the jurisdiction and/or facility.
PI&M-3.2	Develop strategies to communicate the substance of the plan to other jurisdictions, including surrounding communities, state offices, and federal (national/regional) personnel involved in related planning efforts.
PI&M-3.3	Develop strategies to establish communication links with local, state, and federal organizations to obtain feedback on emergency management program changes that may affect the plan.
PI&M-4	Given an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure that organizations and personnel are capable of carrying out their assigned responsibilities.
PI&M-4.1	Develop strategies to ensure that each organization develops the SOPs necessary to facilitate the accomplishment of assigned tasks under the plan.
PI&M-4.2	Develop strategies to assess related training needs.
PI&M-4.3	Identify training programs and assistance available in the public and private sectors.
PI&M-5	Given implementation of an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies for monitoring changes and trends that impact the plan or planning process.
PI&M-5.1	Identify changes and trends that could impact the plan or planning process, including but not limited to: • Economic • Legal • Political • Technological • Social • Demographic
PI&M-5.2	Identify strategies for collecting and assessing information from reviews or critiques of actual hazardous materials incidents affecting the jurisdiction.

PI&M-5.3	Identify strategies to ensure that various organizations with a role under the plan provide feedback as changes occur that may affect the plan.
PI&M-6	Given implementation of an approved integrated hazardous materials plan for a jurisdiction or facility, participate in the design and development of an exercise program that is useful for evaluating and updating the plan.
PI&M-6.1	Describe five types of exercises and their appropriate use in plan evaluation, to include: • Drill • Orientation • Table top • Functional • Full Scale
PI&M-6.2	Identify the goals and objectives of the hazardous materials exercise program and its relationship to the overall planning process.
PI&M-6.3	Identify methods to be used for determining hazardous materials exercise needs, addressing at a minimum: • Number and type of exercises to be conducted • Functions to be tested (preparedness, response, recovery, and mitigation/ prevention) • Exercise goals and objectives • Appropriate scenarios
PI&M-6.4	Identify exercise criteria, resources, and reference materials.
PI&M-6.5	On specific exercises, establish effective policies and plans for working with the Exercise Manager, organizational participants, and others to: • Control the exercise • Recruit and brief participants • Record and evaluate exercise play • Critique exercise results and identify follow-up actions
PI&M-7	Given changes and trends that impact the plan or planning process, incident critiques, exercise results, expert opinion, and other information, develop strategies for conducting periodic reviews and updates of the plan.
PI&M-7.1	Determine whether goals and objectives established in the plan have been achieved.
PI&M-7.2	Evaluate changes and trends, incident critiques, exercise results, expert opinion, and other information to assess the need for plan revisions.
PI&M-7.3	Identify strategies for making the needed revisions to the plan and for implementing the plan revisions.
PI&M-7.4	Identify strategies and timetables for reviewing and updating the plan on a periodic basis.

Hazardous Materials
Planning Curriculum Guidelines:

Facility Planning

General Training Considerations

Scope/Objectives of Training

Facility Planners develop, validate, and maintain emergency response plans and safety plans for any facility subject to federal contingency planning regulations, as well as other facilities that wish to improve emergency preparedness through planning. They also develop procedures to ensure compliance with federal, state, and local mandates for participation in community planning and right-to-know activities. In this context, the term "facility" is meant to have a wide connotation and may include, but is not limited to, any mobile or fixed onshore or offshore building, structure, installation, equipment, pipe, or pipeline.

The Facility Planning specialty area provides participants with the knowledge and skills they need to develop a basic hazardous materials emergency plan for a facility. The primary training audience is facility planners and planning team members. Training objectives cover a broad range of generic competencies, including the ability to function effectively in a team environment, assist in or conduct a basic hazards analysis and capability assessment, work with others to analyze options and draft sections of the plan, and participate in plan implementation, evaluation, and maintenance.

The legislative and regulatory basis for this training can be found primarily in the requirements specified in OSHA 1910.120 for development of employers' emergency response plans, SARA Title III for development of planning jurisdictions' emergency response plans, and various federal agency regulations for the development of facility and transporter emergency response plans. The competencies defined here incorporate generic concepts and processes derived from various sources in the planning literature. Several of the most important reference documents, and more specific models for planning, are described in the Appendices. The training objectives are intended to be comprehensive, i.e., to address the requirements of all identified audience members; thus, training developers and instructors will need to tailor these objectives to meet local audience interests, needs, and planning processes.

Audience

The training audience for Facility Planning includes planning team members who have a defined responsibility in researching, preparing, implementing, and maintaining hazardous materials facility plans. These persons generally represent an organizational or functional specialty in an integrated planning process for the facility. Audience members may include industry owners and executives, business planners, production/process managers, functional managers (e.g., communications, public information, emergency response, etc.), safety officers, technical experts, and others employed by the facility. Personnel who have responsibilities for reviewing and approving facility plans and/or enforcing compliance with existing community regulations and standards may also benefit by training.

Prerequisites or Presumed Prior Knowledge/Skills of Students

Training covers basic skills, with an emphasis on the ability to interpret and use information provided by various technical specialists in developing the plan. More advanced planning skills are addressed under other Planning Specialties. Audience members are assumed to already possess training competencies covered under Planning Orientation, as well as an expertise in the professional discipline that the student represents on the planning committee. It is further assumed that managerial, administrative, and logistic requirements for organizing the planning process, including staff recruitment and assignments, have already been met.

Typical Program Format

Training can typically be accomplished in two to four days of classroom instruction led by an experienced facilitator. Breaking training into modules (e.g., Hazards Analysis) that are delivered at different times is also possible, and this approach may be beneficial if timed to coincide with planning team assignments. However, team building is very important in the planning process, so continuity of student groupings throughout training is recommended.

Methodology and Training Delivery Considerations

It is recognized that the planning needs of facilities, and the resulting training needs of planning team members, can vary greatly, depending on such factors as business size, demographics, product mix, hazards, local resources, and planning preferences. However, training described here is intended to address the generic training requirements of all hazardous materials facility planners. Training managers, course developers, and instructors may need to tailor these materials to meet the unique needs and interests of different audiences, incorporating elements covered in other Planning Specialties, as appropriate. Other training considerations include the following:

- Training should focus on the actual development of facility plans, with the work product and participation in the group planning process used to demonstrate student mastery of the objectives.
- Audiences should be heterogeneous, reflecting the diverse groups and professional disciplines represented in the planning process. It is highly recommended that team members who will work together in subsequent planning efforts be trained together.
- Course methodology should emphasize group interactions, team building, and resolution of interpersonal conflicts, as well as the development of the plan product itself.
- Course materials can be multi-tracked by type of plan (OSHA, EPA, etc.) to facilitate tailoring the instruction to the needs of different audiences.
- If possible, instruction should address practical strategies for consolidating planning requirements (i.e. merging several requirements into one plan development effort) to foster greater planning efficiency.
- Instruction should emphasize the need for on-going planning commitments by the team and the organizations they represent.
- Instruction should emphasize the need for ongoing evaluation at each step in the planning process.
- Instructors should emphasize that steps in the planning process, although taught sequentially, may actually be performed simultaneously.

Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as FACIL-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
FACIL-1	Given an assignment as a facility planning team member, describe an appropriate planning strategy and team member responsibilities in the process.
FACIL-1.1	Describe the benefits of a team approach to planning, and identify skills necessary to participate in the team planning process.
FACIL-1.2	Identify individual roles and responsibilities in the facility planning process, to include work expectations, administrative support systems, and time lines.

Recommended Training

FACIL-1.3	Identify the need to coordinate planning with outside groups (e.g., local government, surrounding jurisdictions, state offices, federal/regional offices such as EPA and FEMA, RRTs, and CAER.)
FACIL-1.4	Demonstrate understanding of the planning process mission statement, goals, and objectives.
FACIL-1.5	Describe the expected results of the planning process, to include required planning elements and plan format.
FACIL-1.6	Identify resources needed to conduct the planning process, including personnel, budgets, and technical capabilities, and solicit these resources within the company.
FACIL-2	Given an assignment as a facility planning team member, demonstrate the ability to conduct a review of federal, state, and local authorities applicable to the planning process.
FACIL-2.1	Describe the purpose and benefits of completing a review of existing plans and authorities.
FACIL-2.2	Identify methods and procedures for reviewing plans and authorities (collecting and organizing information, identifying and clarifying issues, identifying incompatibilities and shortfalls, etc.), including associated costs and staffing requirements.
FACIL-2.3	Identify planning regulatory requirements that apply to the facility, to include consideration of: • SARA Title III • EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)—40 CFR part 112.7(d) and 112.20 to 112.21 • MMS's Facility Response Plan Regulation—30 CFR part 254 • RSPA's Pipeline Response Plan Regulation—49 CFR part 194 • USCG's Facility Response Plan Regulation—33 CFR part 154, subpart F • EPA's Risk Management Programs Regulation—40 CFR part 68 • OSHA's Emergency Action Plan Regulation—29 CFR 1910.38(a) • OSHA's Process Safety Standard—29 CFR 1910.119 • OSHA's HAZWOPER Regulation—29 CFR 1910.120 • EPA's Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, subpart D, 40 CFR part 265, subpart D, and 40 CFR part 279.52 State and local policies, codes, ordinances, etc.
FACIL-2.4	Describe the advantages and disadvantages of all-hazard planning and hazard-specific planning.
FACIL-3	Given an assignment as a facility planning team member, demonstrate the ability to conduct background research appropriate to the planning requirement.

FACIL-3.1	Identify critical internal and external products, services, and operations that impact the facility plan, including: • Internal products and services and the facilities and equipment needed to produce them • External products and services provided by suppliers, especially sole source vendors • Services such as electrical power, water, sewer, gas, telecommunications, and transportation • Operations, equipment, and personnel vital to the continued functioning of the facility
FACIL-3.2	Identify, gather, and review copies of existing hazardous materials plans (community emergency plans, mitigation/prevention plans, response agency SOPs, facility plans, etc.).
FACIL-3.3	Review critiques of actual incidents, exercises, and drills conducted by the facility or by the community with participation by the facility.
FACIL-3.4	Review important changes and trends impacting the facility.
FACIL-3.5	Conduct surveys, interviews, etc. to gather expert opinion on planning needs, as required.
FACIL-3.6	Identify and summarize related planning issues, priorities, concerns, and challenges.
FACIL-4	Given the planning process to be used by the facility, identify the purpose, benefits, methods, expected results, and participant roles in hazards analysis and capability assessment.
FACIL-4.1	Describe the purpose and benefits of conducting a hazards analysis.
FACIL-4.2	Describe the purpose and benefits of conducting a capability assessment.
FACIL-4.3	Describe the methods to be used and the expected results of the facility's hazards analysis and capability assessment processes.
FACIL-4.4	Identify organizational and team member responsibilities in the facility's hazards analysis and capability assessment processes, including the roles of various technical specialists.
FACIL-5	Given the facility's production processes and potential hazards, demonstrate the ability to identify, collect, and interpret hazards analysis and capability assessment data needed for planning.
FACIL-5.1	Collect or assist in collecting data, as identified in *Technical Guidance for Hazards Analysis*.
FACIL-5.2	Identify types of emergencies that have occurred in the community, at the facility, and in similar facilities.

Recommended Training

FACIL-5.3	Identify geographic factors that could contribute to potential emergencies.
FACIL-5.4	Identify types of emergencies that could occur from technological process or system failures.
FACIL-5.5	Identify types of emergencies that could occur as a result of human error.
FACIL-5.6	Identify types of emergencies that could result from the design or construction of the facility and production processes.
FACIL-5.7	For each potential emergency, identify possible complications and relationships to other emergency events, and estimate the probability of occurrence.
FACIL-5.8	Identify and evaluate internal and external resources and capabilities that could be applied in an emergency.
FACIL-5.9	Conduct an insurance review to identify and evaluate facility insurance coverage and benefits in various types of emergency situations.
FACIL-5.10	Review and interpret the data.
FACIL-5.11	Identify, map, and prioritize hazards, risk areas, and vulnerable zones, and identify capability shortfalls and excesses (gap analysis).
FACIL-6	Given the results of the facility's hazards analysis and capability assessment, demonstrate the ability to identify issues and solutions to be addressed in the plan, and assignments for developing the plan.
FACIL-6.1	Identify issues and solutions to be addressed in the facility plan by examining existing plans, hazards analysis results, capability assessment results, and other pertinent information.
FACIL-6.2	Identify facility plan development tasks and assignments.
FACIL-7	Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating the hazardous materials emergency operations plan, to address preparedness, response and short-term recovery.
FACIL-7.1	Identify the planning elements necessary to comply with regulatory requirements, standards, and guidelines.
FACIL-7.2	Develop or update the emergency operations plan to meet the required planning elements.
FACIL-8	Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating a comprehensive prevention/mitigation section in the plan.
FACIL-8.1	Identify prevention/mitigation strategies and techniques to address the identified issues and solutions.

FACIL-8.2	Develop or update the plan to meet all identified prevention/mitigation planning needs.
FACIL-9	Given a draft facility hazardous materials plan, participate as assigned in the plan review and appraisal process.
FACIL-9.1	Describe the purpose and benefits of reviewing the facility plan.
FACIL-9.2	Conduct an internal review of the draft facility plan to assess adequacy and completeness.
FACIL-9.3	Facilitate an external review of the draft facility plan, which may include peer review, management review, and local, state and federal review.
FACIL-9.4	Make necessary revisions, and promote formal plan promulgation.
FACIL-10	Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for implementing the plan.
FACIL-10.1	Describe the purpose and benefits of implementing the plan.
FACIL-10.2	Describe the strategy and methods to be used for implementing the plan, to include: • Disseminating copies of the plan • Briefing and orienting users of the plan • Integrating the plan with other plans and work processes within the facility
FACIL-10.3	Identify options and develop strategies for coordinating the plan with multi-jurisdictional planning efforts.
FACIL-10.4	Identify options and develop strategies for ensuring that personnel are adequately trained to carry out their assigned responsibilities under the plan.
FACIL-10.5	Identify roles and responsibilities for implementing the plan, to include available resources, administrative systems, and time lines.
FACIL-11	Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for evaluating and maintaining the plan.
FACIL-11.1	Describe the purpose and benefits of evaluating and maintaining the plan.
FACIL-11.2	Identify options and develop strategies for monitoring changes and trends affecting the facility and/or jurisdiction.
FACIL-11.3	Identify options and develop strategies for critiquing actual incidents and accidents that occur, and for identifying and implementing remedial actions.
FACIL-11.4	Identify options and develop strategies for developing, conducting, and evaluating exercises and drills.

Recommended Training

FACIL-11.5	Identify options and develop strategies for conducting an annual audit of the facility plan and/or periodically updating and revising the facility plan, as necessary.
FACIL-11.6	Identify roles and responsibilities for evaluating and maintaining the facility plan, to include available resources, administrative systems, and time lines.
FACIL-11.7	Work with planning team members, facility managers, and other facility and community representatives to test planning concepts and measures (e.g., through tabletop exercises and drills), as necessary.

Hazardous Materials
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Planning for Public Education

General Training Considerations

Note: There are several aspects and potential training requirements associated with hazardous materials public education. These include training for Public Information Officers (PIOs) and others who design and develop related programs, strategies, and outreach materials; training for media representatives and others who influence the perceptions of the public; and training for planners in "marketing" the plan to gain public support for the planning process. The Planning Specialty area described here identifies general competencies for individual members of the public. Other facets of public education will be addressed in subsequent editions of the *Guidelines*.

Scope/Objectives of Training

Training in this curriculum area provides an overview of the hazardous materials emergency management system, with an emphasis on the citizen's role in that system. No skill development is attempted. Training should result in a positive attitudinal change, an improved awareness of threats to personal and community safety, an enhanced understanding of the need for and benefits of jurisdictional and facility planning and emergency management, and motivation to improve personal and community preparedness.

Benefits to be derived from training the general public include a greater understanding of and support for the jurisdiction's emergency management system and capabilities; improved citizen understanding of appropriate actions to take in hazardous materials emergency situations; heightened cooperation with responders and prevention/mitigation personnel; and enhanced citizen planning and preparedness for potential incidents in the home or neighborhood.

Audience

The audience for public education training includes all persons who have a "stake" in the hazardous materials emergency management system, although they have no defined role in the development and implementation of emergency operations and mitigation/prevention plans. Potential audience members include the general public, community groups, volunteer groups, business/industry associations, employee groups, and others with a self-interest in improving community and individual/family preparedness.

Prerequisites or Presumed Prior Knowledge/Skills of Students

Participants are assumed to have an interest in hazardous materials threats facing the community, as well as the jurisdiction's ability to provide effective hazardous materials emergency management. However, no prior knowledge of community plans and systems is required to participate in training.

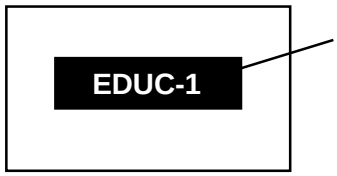
Typical Program Format

A short (one to two hours or as need is expressed by the customer) facilitator-led presentation or seminar.

Methodology and Training Delivery Considerations

Training should emphasize opportunities for interaction with audience members to identify and address individual perceptions and concerns. Whenever possible, use of dynamic media (video, slides, computer simulations, CD-ROM, etc.) is encouraged to promote interest and motivate support. Depending on audience needs and time, simple activities, exercises, or role plays emphasizing local examples and realistic personal situations may be appropriate.

The instructor should be able to discuss a broad range of topics of potential interest to audience members, including community and household hazardous materials threats; requirements of the Emergency Planning and Community Right to Know Act; pertinent jurisdiction and facility plans and capabilities; technical resources and ways to access community information (MSDS forms, chemical inventories, release reports, etc.), and materials available from EPA, DOT, FEMA, NIEHS, and other federal, state, and local sources.



Objective Identification Legend

This is the identification of the objective used in this document. It matches the identification code used in course assessment references. (See the Training Program Management section of this document.) Decimal numbers (such as EDUC-1.1) indicate enabling objectives supporting the primary objective.

Identification	***Recommended** Training Objectives*
EDUC-1	Given residency in a specific jurisdiction, identify the purpose, benefits, and components of the jurisdiction's hazardous materials emergency management system.
EDUC-1.1	Describe the hazardous materials threat within the jurisdiction, to include the routine use of chemicals by the general public from everyday sources.
EDUC-1.2	Identify major legislation affecting the jurisdiction's hazardous materials emergency management system, including the Emergency Planning and Community Right-to-Know Act.
EDUC-1.3	Describe the jurisdiction's hazardous materials emergency management system.
EDUC-1.3.1	Describe the four phases of the comprehensive emergency management system (preparedness, response, recovery, and mitigation/prevention).
EDUC-1.3.2	Explain the purpose and participants in the jurisdiction's integrated response system.
EDUC-1.3.3	Explain the purpose and participants in the jurisdiction's prevention and mitigation system.
EDUC-1.3.4	Describe general requirements for facility planning, safety management, and emergency response.
EDUC-1.4	Identify the purpose and participants in the jurisdiction's hazardous materials planning process.
EDUC-1.4.1	Identify the jurisdiction's LEPC planning district and planning requirements.
EDUC-1.4.2	Identify major steps and participants in the hazardous materials planning process, to include hazards analysis, capability assessment, plan development, and plan evaluation.

Recommended Training

EDUC-1.4.3	Identify major components in the jurisdiction's hazardous materials plan.
EDUC-2	Given residency in a specific jurisdiction, describe the citizen's role in the jurisdiction's hazardous materials emergency management system.
EDUC-2.1	Identify the personal and community benefits of citizen participation in the jurisdiction's hazardous materials emergency management system.
EDUC-2.2	Identify ways to participate in and contribute to the jurisdiction's hazardous materials emergency management system (e.g. provide feedback, serve as resource, attend meetings, join committees)
EDUC-2.3	Describe the citizens' role in individual and family preparedness.
EDUC-2.3.1	Identify steps in conducting a personal hazards analysis, to include threats to the neighborhood.
EDUC-2.3.2	Identify components of a personal and family preparedness plan.
EDUC-2.3.3	Identify steps in testing and maintaining personal/family preparedness plans.
EDUC-3	Given residency in a specific jurisdiction, identify personal actions to promote hazardous materials emergency management.
EDUC-3.1	Identify available sources of assistance and information and requirements for accessing them.
EDUC-3.2	Develop an action plan for promoting hazardous materials emergency management and personal/family preparedness.

Hazardous Materials
Planning Curriculum Guidelines:

Appendix A:
Planning Guide Summaries

Appendix A
Planning Guide Summaries

This appendix provides content summaries of key reference documents used in the preparation of the *Hazardous Materials Planning Curriculum Guidelines*. These materials include the *Guide for All-Hazard Emergency Operations Planning* (FEMA SLG 101), *Hazardous Materials Emergency Planning Guide* (NRT-1), *Technical Guidance for Hazards Analysis* (EPA/FEMA/DOT), *Handbook of Chemical Hazard Analysis Procedures* (FEMA/DOT/EPA), and *Emergency Management Guide for Business & Industry* (FEMA 141). More information on the planning models described in these materials is presented in Appendix B.

Federal Emergency Management Agency, *Guide for All-Hazard Emergency Operations Planning*, SLG 101, September 1996.

The Guide is designed as a "toolbox" of ideas and advice, not a sample emergency operations plan (EOP). It is intended primarily for use by personnel responsible for EOP development and maintenance in state and local emergency management agencies. It establishes no requirements, and its recommendations may be used, adapted, or disregarded.

This SLG replaces Civil Preparedness Guide (CPG) 1-8, *Guide for the Development of State and Local Emergency Operations Plans* (dated September 10, 1990); CPG 1-8A, *Guide for the Review of State and Local Emergency Operations Plans,* (dated October 1992); and CPG 1-10, *Guide for the Development of a State and Local Continuity of Government Capability* (dated July 27, 1987), which have been rescinded.

The document is organized as follows:

- Chapter 1 explains what an EOP is at the state and local levels, why the EOP is a necessary part of a comprehensive approach to emergency management, and how the EOP relates to other aspects of the comprehensive, risk-based, all-hazard approach.
- Chapter 2 describes the approach FEMA recommends for a step-by-step process of risk-based, all-hazard emergency operations planning (see Appendix B for more detail).
- Chapter 3 suggests how to format the results of the planning process in a written EOP. Components discussed include the Basic Plan, functional annexes, hazard-specific appendices, SOPs, and checklists.
- Chapter 4 lists and discusses elements of the Basic Plan, and provides detailed examples of the types of tasking that should be assigned to agencies, organizations, and individuals under the plan.
- Chapter 5 explains the purpose of functional annexes, and provides a brief description of eight core functions: Direction and Control, Communications, Warning, Emergency Public Information, Evacuation, Mass Care, Heath and Medical Services, and Resource Management.
- Chapter 6 notes unique aspects of certain hazards, including associated regulatory requirements. It suggests how to address hazardous materials in the all-hazard EOP rather than in a stand-alone plan. The chapter is not meant to replace hazard-specific planning guidance issued by the National Response Team.
- Chapter 7 contains information on integrating State EOPs with the Federal Response Plan, so that all levels of government can provide a coordinated response to communities in need.

National Response Team, *Hazardous Materials Emergency Planning Guide*, NRT-1, March 1987.

This guidance is intended to help local communities prepare for potential incidents involving hazardous materials. It describes how to form a local planning team, find a team leader, identify and analyze hazards, identify existing response equipment and personnel, write a plan, and keep the plan up to date. The information can be used both by local communities developing their own plan, and by local emergency planning committees formed in accord with the "Emergency Planning and Community Right-to-Know Act of 1986."

State officials seeking to develop a state emergency plan that is closely coordinated with local plans can adapt this guidance to their purposes. Likewise, officials of chemical plants, railroad yards, and shipping and trucking companies can use the guide to coordinate their own hazardous materials emergency planning with that of the local community.

The guidance deals specifically with response to hazardous materials incidents—both at fixed facilities (manufacturing, processing, storage, and disposal) and during transportation (highways, waterways, rail, and air). Plans for responding to radiological incidents and natural emergencies such as hurricanes, floods, and earthquakes are not the focus of this guidance, although most aspects of plan development and appraisal are common to these emergencies.

The guide is intended to focus community activity on emergency preparedness and response; provide communities with information useful in organizing the planning task; furnish criteria to determine risk and to help communities decide whether they need to plan for hazardous materials incidents; help communities conduct planning that is consistent with their needs and capabilities; and provide a method for continually updating a community's emergency plan.

The document is organized as follows:

Chapter 1: Introduction
Chapter 2: Selecting and Organizing the Planning Team
Chapter 3: Tasks of the Planning Team
Chapter 4: Developing the Plan
Chapter 5: Hazardous Materials Planning Elements
Chapter 6: Plan Appraisal and Continuing Planning

Several appendices provide helpful information for community planning. In particular, Appendix A includes a detailed summary of Title III of SARA, and Appendix D presents criteria that can be used to assess a state or local hazardous materials emergency response preparedness program.

U.S. Environmental Protection Agency, Federal Emergency Management Agency, and U.S. Department of Transportation, *Technical Guidance for Hazards Analysis*, December 1987.

The purpose of this guide is to help local emergency planning committees (LEPCs) conduct site-specific hazards analyses for airborne releases of extremely hazardous substances (EHSs), as required by Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). Although these substances may also threaten property and the environment, this guide is primarily concerned with lethal effects of airborne substances on humans.

This document represents a joint effort by EPA, FEMA, and DOT to provide coordinated and coherent technical guidance. Although the guide can be useful to all community and industry planners, it is intended especially for LEPCs established under the provisions of SARA. The three steps of hazards analysis—hazards identification, vulnerability analysis, and risk analysis—provide a decision-making process for the LEPCs to follow as they undertake the development of comprehensive emergency plans mandated by SARA Title III.

This document is organized as follows:

Chapter 1: Introduction and Overview

Chapter 2: Hazards Analysis: An Overview
- 2.1 - Hazards Identification
- 2.2 - Vulnerability Analysis for Airborne Extremely Hazardous Substances
- 2.3 - Risk Analysis

Chapter 3: Step-by-Step Procedures for Conducting a Hazards Analysis of Extremely Hazardous Substances

Chapter 4: Using the Results of a Hazards Analysis

Appendices:
- Appendix A: Acronyms and Glossary of Terms
- Appendix B: The Criteria Used to Identify Extremely Hazardous Substances
- Appendix C: The List of Extremely Hazardous Substances
- Appendix D: Additional Information on Levels of Concern
- Appendix E: Sample Profile
- Appendix F: Fire and Reactivity Hazards
- Appendix G: Equations Used for the Estimation of Vulnerable Zones
- Appendix H: General Considerations for Evacuation or In-Place Sheltering
- Appendix I: Information Collecting to Evaluate Sites for Emergency Planning
- Appendix J: Methods for Evaluating Hazards Used by Facilities
- Appendix K: Evaluation Guide for Available Computer Applications Addressing Hazardous Materials Emergency Response Planning
- Appendix L: Selected Bibliography
- Appendix M: EPA and FEMA Regional Contacts

Federal Emergency Management Agency, U.S. Department of Transportation, and U.S. Environmental Protection Agency, *Handbook of Chemical Hazard Analysis Procedures*.

The *Handbook of Chemical Hazard Analysis Procedures* has several objectives, one of which is to expand *NRT-1* and the *Technical Guidance on Hazards Analysis* documents by including information for explosive, flammable, reactive, and otherwise dangerous chemicals. Although *NRT-1* was aimed at addressing planning for all types of hazardous materials, SARA Title III required local planners to focus on a specific initial list of acutely toxic chemicals (referred to as Extremely Hazardous Substances) due to their high inhalation toxicity when airborne, and this was the primary focus of the supplemental guidance document. By introducing additional methodologies on how to plan for these and other dangerous chemicals, this handbook serves as a stepping stone from *NRT-1* and the *Technical Guidance on Hazards Analysis* to a more comprehensive approach for emergency planning.

Beyond providing additional methodologies for assessing the potential impacts of hazardous materials releases, this handbook also expands the three-step hazards analysis approach (hazard identification, vulnerability analysis, and risk analysis) presented in *NRT-1* and its supplement by introducing a four-step approach involving hazard identification, consequence analysis, probability analysis, and risk analysis. In addition, it provides a tutorial on hazardous chemicals, suggestions for applying hazard analysis results to writing and updating an emergency plan, and an expanded discussion of issues relating to sheltering-in-place (in-place protection) and evacuation.

The document is organized as follows:

Chapter 1: Introduction
Chapter 2: Key Properties of Chemical Substances
Chapter 3: Actions Upon Release to the Environment
Chapter 4: Fire Hazards of Chemical Substances

Chapter 5: Explosion Hazards of Chemical Substances
Chapter 6: Toxicity Hazards of Chemical Substances
Chapter 7: Reactivity Hazards of Chemical Substances
Chapter 8: Hazardous Material Classification Systems
Chapter 9: Overview of the Hazard Analysis Process
Chapter 10: Hazard Identification Guidelines
Chapter 11: Probability Analysis Procedures
Chapter 12: Consequence Analysis Procedures
Chapter 13: Formulation of a Planning Basis
Chapter 14: Use of Hazard Analysis Results in Emergency Planning

Appendices:
- Appendix A: A Tutorial on Fundamental Mathematical Skills
- Appendix B: Technical Basis for Consequence Analysis Procedures
- Appendix C: Overview of "Shelter-in-Place" Concepts
- Appendix D: Chemical Compatibility Chart
- Appendix E: Guide to Installation of the ARCHIE Computer Program
- Appendix F: Basis of Probability Analysis Procedures

Federal Emergency Management Agency, *Emergency Management Guide for Business and Industry,* FEMA 141, October 1993.

This guide provides step-by-step advice on how to create and maintain a comprehensive emergency management program. It can be used by manufacturers, corporate offices, retailers, utilities, or any organization where a sizable number of people work or gather. It applies equally to businesses large or small, whether they operate from a high-rise building or an industrial complex, and whether they own, rent or lease property.

Users of the document need not have in-depth knowledge of emergency management. All that is required is the authority to create a plan and a commitment from the chief executive officer to make emergency management part of the corporate culture.

Businesses that already have a plan can use this guide as a resource to assess and update the plan. The guide is organized as follows:

Section 1: Four Steps in the Planning Process—how to form a planning team; how to conduct a vulnerability analysis; how to develop a plan; and how to implement the plan. The information can be applied to virtually any type of business or industry.

Section 2: Emergency Management Considerations—how to build such emergency management capabilities as life safety, property protection, communications, and community outreach.

Section 3: Hazard-Specific Information—technical information about specific hazards the facility may face.

Section 4: Information Sources—where to turn for additional information.

Hazardous Materials
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Appendix B: Planning Models

Appendix B
Planning Models

Various explanations of the planning process can be found in the literature, including those described in the *Guide for All-Hazard Emergency Operations Planning* (FEMA SLG 101), *Hazardous Materials Emergency Planning Guide* (NRT-1), *Technical Guidance for Hazards Analysis* (EPA/FEMA/DOT), *Handbook of Chemical Hazard Analysis Procedures* (FEMA/DOT/EPA), and *Emergency Management Guide for Business & Industry* (FEMA 141). These approaches to planning, which are briefly described here, incorporate the generic functional requirements of planning, although the steps and procedures may be defined somewhat differently. Jurisdictions and facilities should select and/or modify these models to best meet their unique planning needs and preferences.

Federal Emergency Management Agency, *Guide for All-Hazard Emergency Operations Planning*, SLG 101, September 1996.

Chapter 2 of this Guide, The Planning Process, describes principles and major steps recommended for developing an all-hazard plan for protecting lives and property within the jurisdiction. In particular, the benefits of a team approach to planning are emphasized, including the role of the Chief Executive Official (CEO). Steps in the development and continual refinement of an emergency operations plan (EOP) are summarized as follows:

I. **Research**—This phase involves reviewing the jurisdiction's planning framework, analyzing the hazards faced by the jurisdiction, determining the resource base, and noting characteristics of the jurisdiction that could affect emergency operations. Steps in research include:

A. Review applicable laws, regulatory requirements, local plans, mutual aid agreements, and existing guidance.

B. Conduct a Hazard/Risk Analysis
   1. Identify hazards
      a. List hazards that concern emergency management
      b. Determine whether these hazards have occurred or could occur
   2. Profile hazards and their potential consequences
      a. Develop information on each hazard (frequency, magnitude, location, etc.)
      b. Develop information on the potential consequences of the hazard
   3. Compare and prioritize risks
   4. Create and apply scenarios

C. Determine the resource base—list and quantify resources available for emergency response and recovery. Compare them with those needed for an effective emergency response to determine shortfalls.

D. Note special facets of the planning environment—geographic and topographic features that may affect operations, transportation routes, special populations, demographic and other trends, etc.

II. **Development**—During this phase, the EOP is written through steps similar to these: developing a rough draft of the basic plan, functional annexes, and hazard-specific appendices; conducting preliminary briefings and interviews; conducting initial planning meetings and establishing committees for parts of the EOP; working with committees on successive drafts; preparing necessary graphics, and producing and circulating a final draft for planning team review and comment; holding meetings to obtain feedback and concurrence from organizations with identified responsibilities under the plan; obtaining official promulgation of the EOP; and printing and distributing the EOP.

III. **Validation**—During this phase, the EOP is checked for conformity to applicable regulatory requirements and the standards of federal and state agencies. Recommended steps include conducting tabletop exercises with key representatives of tasked organizations as a practical means to help validate the plan; consulting with and participating in plans reviews with the next level of government; and using functional and full-scale emergency management exercises to determine if an EOP is understood and "works."

IV. **Maintenance**—As problems emerge, situations change, gaps become apparent, and requirements are altered, the plan must be continually adapted to remain useful and up-to-date. Possible steps include:

A. Remedial Action Process designed to (1) capture information from exercises, post-disaster critiques, self-assessments, audits, administrative reviews, and the like which may indicate deficiencies; (2) bring together members of the planning team to discuss problems and to consider and assign responsibility for remedies; and (3) tracking and following up on assigned actions.

B. Revision Process for review and modification of the EOP on at least an annual basis.

C. Implementing Documents to ensure that each tasked organization or individual develops the SOPs necessary to facilitate the accomplishment of assigned tasks.

Attachment C of the Guide, Hazardous Materials, provides additional information on plan requirements for locating hazardous materials at fixed facilities and on transport routes, estimating vulnerable zones, determining vulnerability, and assessing risk. Planning considerations unique to hazardous materials are described under the following major headings:

- Direction and control
- Emergency public information
- Evacuation
- Mass care
- Health and medical
- Resource management

National Response Team, *Hazardous Materials Emergency Planning Guide*, NRT-1, March 1987.

This guidance presents a comprehensive approach to hazardous materials planning. However, it is emphasized that every community must plan according to its own situation. Small communities with few planning resources, or communities with few or no threatening hazards, can choose the planning elements appropriate to their circumstances. Steps in the planning process can be summarized as follows:

I. Organizing the Planning Process
   - A. Selecting the planning team
   - B. Selecting the team leader
   - C. Organizing for planning team responsibilities, including staffing, managing the planning tasks, and the use of computers

II. Review of Existing Plans
   - A. Reviewing applicable state and local emergency plans
   - B. Consulting with state and local agencies and volunteer organizations, regional offices of federal agencies, local industry and industrial associations, the RRT and OSC, etc.

III. Hazards Analysis
- A. Hazards Identification
- B. Vulnerability Analysis
- C. Risk Analysis

IV. Capability Assessment—sample questions are presented to help the planning team evaluate preparedness, prevention, and response resources and capabilities in the following three categories:
- A. Facility resources
- B. Transporter resources
- C. Community resources

V. Developing the Plan
- A. Developing or revising a hazardous materials appendix to a multi-hazard EOP
- B. Developing or revising a plan covering only hazardous materials

Planning elements and plan requirements that should be considered in this phase of the process are described in detail, including the following fourteen response functions:

- Initial Notification of Response Agencies
- Direction and Control
- Communication (among Responders)
- Warning Systems and Emergency Public Notification
- Public Information/Community Relations
- Resource Management
- Health and Medical
- Response Personnel Safety
- Personal Protection of Citizens
- Fire and Rescue
- Law Enforcement
- Ongoing Incident Assessment
- Human Services
- Public Works

VI. Plan Appraisal and Continuing Planning
- A. Plan Review and Approval
  1. Internal review
  2. External review
- B. Keeping the plan up-to-date
- C. Continuing planning
  1. Exercises
  2. Incident review
  3. Training

U.S. Environmental Protection Agency, Federal Emergency Management Agency, and U.S. Department of Transportation, *Technical Guidance for Hazards Analysis*, December 1987.

This guidance is compatible with and recommends the same approach to hazardous materials planning as NRT-1. However, significantly more detail is presented on the Hazards Analysis step of the process. The hazards analysis is separated into two phases. The first phase is the initial screening of all facilities reporting Extremely Hazardous Substances (EHSs) on their premises in excess of their threshold planning quantities (TPQs). The initial screening is performed to establish priorities among reporting facilities using credible worst case assumptions. The second phase represents a reassessment by order of priority of the potential hazards posed by the reporting facilities. This is accomplished through the reevaluation of the assumptions used for the initial screening.

Both the initial screening and the reevaluation phases utilize the three basic steps of hazards analysis: hazards identification, vulnerability analysis, and risk analysis. Steps in the process are summarized as follows:

Initial Screening

I. Hazards Identification

A. List facilities that have reported EHSs in the community in excess of the TPQ.
B. Contact each facility on the list for information on the EHSs present.
C. Obtain information on transportation routes of EHSs, if possible.
D. Obtain information on hazardous materials, facilities, and transportation routes (other than for those with EHSs above the TPQ) listed by SERCs (optional).

II. Vulnerability Analysis

A. Estimate the vulnerable zone for screening using credible worst case assumptions.
B. Identify characteristics of human populations within the estimated vulnerable zone.
C. Identify critical facilities within the estimated vulnerable zone.

III. Risk Analysis

A. Collect information obtained in hazards identification and vulnerability analysis.
B. Make rough estimate of risks based on the likelihood of a release and severity of consequences.
C. Identify those facilities with higher priority due to the estimated risks they pose.

Planning for Facilities by Priority

IV. Hazards Identification

A. Contact each facility on the list and other expert sources for additional information.
B. Obtain additional information on typical transportation conditions, if possible.

V. Vulnerability Analysis

A. Reestimate the vulnerable zone using reevaluated assumptions from the facility and other expert sources.
B. Identify characteristics of human populations within the estimated vulnerable zone.
C. Identify critical facilities within the estimated vulnerable zone.

VI. Risk Analysis

A. Collect all information obtained in hazards identification and vulnerability analysis in a table.
B. Obtain additional information on community and facility safeguards, response capabilities, and accident records.
C. Make a judgment of the probability of release and severity of consequences.
D. Organize all information (from A, B, and C) in a matrix format.
E. Rank risks.
F. Develop or revise emergency plans for higher priority facilities.

Federal Emergency Management Agency, U.S. Department of Transportation, and U.S. Environmental Protection Agency, *Handbook of Chemical Hazard Analysis Procedures*.

This guide presents four basic steps for conducting a hazard analysis, and a related fifth step that takes advantage of the knowledge gained during the effort to develop a comprehensive emergency plan. These steps include:

I. Hazard Identification—location, identification, and characterization of potential spill sources and accident sites in the jurisdiction or locality of concern. This step essentially concludes with the identification and/or postulation of fundamental accident scenarios requiring further consideration and analysis. Results from the probability analysis which follows can often help in further refining these scenarios. Methods discussed include:

- Enforcement of right-to-know laws
- Use of fire department and building inspection records
- Industry questionnaires
- Meetings with business organizations and trade groups
- Meetings with individual business personnel
- Queries of rail, marine, and pipeline transportation companies
- Truck traffic surveys
- Use of permit records
- Use of the “Yellow Pages”
- Access to detailed chemical property data and hazard information

II. Probability Analysis—evaluation of the likelihood of individual accident scenarios. This step permits examination and/or prioritization of potential accident scenarios in terms of their probability of occurrence. Categories of activities discussed include:

- Bulk transportation by highway
- Bulk transportation by rail
- Bulk transportation by barge or other marine vessel
- Transportation by pipeline
- Bulk storage, processing, or handling at fixed facilities
- Transportation of packaged hazardous materials
- Transportation by air

III. Consequence Analysis—evaluation of the consequences and impacts associated with the occurrence of postulated accident scenarios. This step provides an understanding of the nature and outcome of an accident and permits examination and/or prioritization of scenarios in terms of their potential impact on people and property. The Automated Resource for Chemical Hazard Incident Evaluation (ARCHIE) computer program and a set of hazard assessment procedures and models are discussed.

IV. Risk Analysis—combination of results from the accident probability and consequence analysis efforts to provide a measure of overall risk associated with the specific activity or activities. The effort permits examination and/or prioritization of scenarios in terms of *overall* risk. Steps include:

- Definition of annual accident probability categories
- Definition of accident severity categories
- Application of screening guidelines

V. Formulation of a Planning Basis—use of the results of the above activities during actual development and preparation of an emergency plan. The material includes discussion of 43 separate topics in 13 subject areas, as follows:

- Notification
- Command and Communications
- Evacuation
- Fire response
- Health Care
- Personal Protection
- Public Relations
- Spill Containment and Cleanup
- Spill Documentation
- Spill Monitoring
- Post-Spill Recovery
- Training
- Waste Disposal

Federal Emergency Management Agency, *Emergency Management Guide for Business & Industry*, FEMA 141, October 1993.

This document emphasizes the emergency planning and management needs of business and industry. Four steps are identified in the planning process, as follows:

I. Establish a Planning Team
   A. Form the team
   B. Establish authority
   C. Issue a mission statement
   D. Establish a schedule and budget

II. Analyze Capabilities and Hazards
   A. Where do you stand right now?
      1. Review internal plans and policies
      2. Meet with outside groups
      3. Identify codes and regulations
      4. Identify critical products, services, and operations
      5. Identify internal resources and capabilities
      6. Identify external resources
      7. Do an insurance review

   B. Conduct a vulnerability analysis
      1. List potential emergencies
      2. Estimate probability
      3. Assess the potential human impact
      4. Assess the potential property impact
      5. Assess the potential business impact
      6. Assess internal and external resources
      7. Add the columns

III. Develop the Plan
- A. Identify challenges and prioritize activities
- B. Write the plan
- C. Establish a training schedule
- D. Coordinate with outside organizations
- E. Maintain contact with other corporate offices
- F. Review, conduct training and revise
- G. Seek final approval
- H. Distribute the plan

IV. Implement the Plan
- A. Integrate the plan into company operations
- B. Conduct training (including exercises and drills)
- C. Evaluate and modify the plan

The guide also identifies planning considerations that are unique to hazardous materials, as well as core operational considerations of emergency management, in the following categories:

- Direction and Control
- Communications
- Life Safety
- Property Protection
- Community Outreach
- Recovery and Restoration
- Administration and Logistics

Federal Register

Wednesday
June 5, 1996

Part II

Environmental Protection Agency

Department of Transportation

Coast Guard

Research and Special Programs Administration

Department of the Interior

Minerals Management Service

Department of Labor

Occupational Safety and Health Administration

The National Response Team's Integrated Contingency Plan Guidance; Notice

ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF TRANSPORTATION

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DEPARTMENT OF THE INTERIOR

Minerals Management Service

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

[FRL–5512–8]

The National Response Team's Integrated Contingency Plan Guidance

AGENCY: Environmental Protection Agency (EPA), U.S. Coast Guard (USCG), Minerals Management Service (MMS), Research and Special Programs Administration (RSPA), Occupational Safety and Health Administration (OSHA).

ACTION: Notice.

SUMMARY: The U.S. Environmental Protection Agency, as the chair of the National Response Team (NRT), is announcing the availability of the NRT's Integrated Contingency Plan Guidance (''one plan''). This guidance is intended to be used by facilities to prepare emergency response plans. The intent of the NRT is to provide a mechanism for consolidating multiple plans that facilities may have prepared to comply with various regulations into one functional emergency response plan or integrated contingency plan (ICP). This notice contains the suggested ICP outline as well as guidance on how to develop an ICP and demonstrate compliance with various regulatory requirements. The policies set out in this notice are intended solely as guidance.

ADDRESSES: Additional copies of this one-plan guidance can be obtained by writing to the following address: William Finan, U.S. Environmental Protection Agency, Mail Code 5101, 401 M Street SW, Washington, DC 20460. Copies of the ICP Guidance are also available by calling the EPCRA/RCRA/Superfund Hotline at (800) 424–9346 (in the Washington, DC, metropolitan area, (703) 412–9810). In addition, this guidance is available electronically at the home page of EPA's Chemical Emergency Preparedness and Prevention Office (http://www.epa.gov/swercepp/).

FOR FURTHER INFORMATION CONTACT: William Finan, U.S. Environmental Protection Agency, Mail Code 5101, 401 M Street, SW., Washington, DC 20460, at (202) 260–0030 (E-Mail homepage.ceppo@epamail.epa.gov—please include ''one plan'' in the subject line). In addition, the EPCRA/RCRA/Superfund Hotline can answer general questions about the guidance.

For further information and guidance on complying with specific regulations, contact: for EPA's Oil Pollution Prevention Regulation: Bobbie Lively-Diebold, U.S. Environmental Protection Agency, Mail Code 5203G, 401 M Street, SW., Washington, DC 20460, at (703) 356–8774 (E-Mail Lively.Barbara@epamail.epa.gov), or the SPCC Information Line at (202) 260–2342); for the U.S. Coast Guard's Facility Response Plan Regulation: LCDR Mark Hamilton, U.S. Coast Guard, Commandant (G–MOR), 2100 2nd Street, SW., Washington, DC 20593, at 202–267–1983 (E-Mail M.Hamilton/G-M03@CGSMTP.uscg.mil); for DOT/RSPA's Pipeline Response Plan Regulation: Jim Taylor, U.S. Department of Transportation, Room 2335, 400 7th Street, SW., Washington, DC 20590 at (202) 366–8860 (E-Mail OPATEAM@RSPA.DOT.GOV); for pertinent OSHA regulations, contact either your Regional or Area OSHA office; for DOI/MMS' Facility Response Plan Regulation: Larry Ake, U.S. Department of the Interior—Minerals Management Service, MS 4700, 381 Elden Street, Herndon, VA 22070–4817 at (703) 787–1567 (E-Mail Larry__Ake@SMTP.MMS.GOV); for EPA's Risk Management Program Regulation: William Finan (see above); and for RCRA's Contingency Planning Requirements, contact the EPCRA/RCRA/Superfund Hotline (see above).

The NRT welcomes comments on specific implementation issues related to this guidance. Please provide us with information about the successful use of this guidance, about problems with using this guidance, as well as suggestions for improving the guidance. Send comments to William Finan (see above) or to any of the other people listed in the previous paragraph.

SUPPLEMENTARY INFORMATION:

Presidential Review Findings

Section 112(r)(10) of the Clean Air Act required the President to conduct a review of federal release prevention, mitigation, and response authorities. The Presidential Review was delegated to EPA, in coordination with agencies and departments that are members of the National Response Team (NRT). The Presidential Review concluded that, while achieving its statutory goals to protect public safety and the environment, the current system is complex, confusing, and costly. It identified several key problem areas and recommended a second phase to address these issues. One of the issues identified by the Presidential Review is the multiple and overlapping federal requirements for facility emergency response plans.

NRT Policy Statement

This one-plan guidance is intended to be used by facilities to prepare emergency response plans for responding to releases of oil and non-radiological hazardous substances. The intent of NRT is to provide a mechanism for consolidating multiple plans that facilities may have prepared to comply with various regulations into one functional emergency response plan or integrated contingency plan (ICP). A number of statutes and regulations, administered by several federal agencies, include requirements for emergency response planning. A particular facility may be subject to one or more of the following federal regulations:

- EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements)—40 CFR part 112.7(d) and 112.20–.21;
- MMS's Facility Response Plan Regulation—30 CFR part 254;
- RSPA's Pipeline Response Plan Regulation—49 CFR part 194;
- USCG's Facility Response Plan Regulation—33 CFR part 154, Subpart F;
- EPA's Risk Management Programs Regulation—40 CFR part 68;
- OSHA's Emergency Action Plan Regulation—29 CFR 1910.38(a);
- OSHA's Process Safety Standard—29 CFR 1910.119;
- OSHA's HAZWOPER Regulation—29 CFR 1910.120; and
- EPA's Resource Conservation and Recovery Act Contingency Planning Requirements—40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52.

In addition, facilities may also be subject to state emergency response planning requirements that this guidance does not specifically address. Facilities are encouraged to coordinate development of their ICP with relevant state and local agencies to ensure compliance with any additional regulatory requirements.

Individual agencies' planning requirements and plan review procedures are not changed by the advent of the ICP format option. This one-plan guidance has been developed

to assist facilities in demonstrating compliance with the existing federal emergency response planning requirements referenced above. Although it does not relieve facilities from their current obligations, it has been designed specifically to help meet those obligations. Adherence to this guidance is not required in order to comply with federal regulatory requirements. Facilities are free to continue maintaining multiple plans to demonstrate federal regulatory compliance; however, the NRT believes that an integrated plan prepared in accordance with this guidance is a preferable alternative.

The NRT realizes that many existing regulations pertaining to contingency planning require review by a specific agency to determine compliance with applicable requirements. It is not the intent of the NRT to modify existing agency review procedures or to supersede the requirements of a regulation.

This one-plan guidance was developed through a cooperative effort among numerous NRT agencies, state and local officials, and industry and community representatives. The NRT and the agencies responsible for reviewing and approving federal response plans to which the ICP option applies agree that integrated response plans prepared in the format provided in this guidance will be acceptable and be the federally preferred method of response planning. The NRT realizes that alternate formats for integrating multiple plans already exist and that others likely will be developed. Certain facilities may find those formats more desirable than the one proposed here. The NRT believes that a single functional plan is preferable to multiple plans regardless of the specific format chosen. While they are acceptable, other formats may not allow the same ease of coordination with external plans. In any case, whatever format a facility chooses, no individual NRT agency will require an integrated response planning format differing from the ICP format described here. The NRT anticipates that future development of all federal regulations addressing emergency response planning will incorporate use of the ICP guidance. Also, developers of state and local requirements will be encouraged to be consistent with this document.

The ICP guidance does not change existing regulatory requirements; rather, it provides a format for organizing and presenting material currently required by the regulations. Individual regulations are often more detailed than the ICP guidance. To ensure full compliance, facilities should continue to read and comply with all of the federal regulations that apply to them. Furthermore, facilities submitting an ICP (in whatever format) for agency or department review will need to provide a cross-reference to existing regulatory requirements so that plan reviewers can verify compliance with these requirements. The guidance contains a series of matrices designed to assist owners and operators in consolidating various plans and documenting compliance with federal regulatory requirements. (See Attachments 2 and 3.) The matrices can be used as the basis for developing a cross-reference to various regulatory requirements.

This guidance also provides a useful contingency planning template for owners and operators of facilities not subject to the federal regulations cited previously.

Integrated Contingency Plan Philosophy

The ICP will minimize duplication in the preparation and use of emergency response plans at the same facility and will improve economic efficiency for both the regulated and regulating communities. Facility expenditures for the preparation, maintenance, submission, and update of a single plan should be much lower than for multiple plans.

The use of a single emergency response plan per facility will eliminate confusion for facility first responders who often must decide which of their plans is applicable to a particular emergency. The guidance is designed to yield a highly functional document for use in varied emergency situations while providing a mechanism for complying with multiple agency requirements. Use of a single integrated plan should also improve coordination between facility response personnel and local, state, and federal emergency response personnel.

The adoption of a standard plan format should facilitate integration of plans within a facility, in the event that large facilities may need to prepare separate plans for distinct operating units. The ICP concept should also allow coordination of facility plans with plans that are maintained by local emergency planning committees (LEPCs),[1] Area Committees,[2] co-operatives, and mutual aid organizations. In some cases, there are specific regulatory requirements to ensure that facility plans are consistent with external planning efforts. Industry use of this guidance along with active participation on local and Area Committees will improve the level of emergency preparedness and is therefore highly encouraged.

In some areas, it may be possible to go beyond simple coordination of plans and actually integrate certain information from facility plans with corresponding areas of external plans. The adoption of a single, common ICP outline such as the one proposed in this guidance would facilitate a move toward integration of facility plans with local, state, and federal plans.

The projected results described above will ultimately serve the mutual goal of the response community to more efficiently and effectively protect public health, worker safety, the environment, and property.

Scope

This one-plan guidance is provided for any facility subject to federal contingency planning regulations and is also recommended for use by other facilities to improve emergency preparedness through planning. In this context, the term ''facility'' is meant to have a wide connotation and may include, but is not limited to, any mobile or fixed onshore or offshore building, structure, installation, equipment, pipe, or pipeline.

Facility hazards need to be addressed in a comprehensive and coordinated manner. Accordingly, this guidance is broadly constructed to allow for facilities to address a wide range of risks in a manner tailored to the specific needs of the facility. This includes both physical and chemical hazards associated with events such as chemical releases, oil spills, fires, explosions, and natural disasters.

Organizational Concepts

The ICP format provided in this one-plan guidance (See Attachment 1) is organized into three main sections: an introductory section, a core plan, and a series of supporting annexes. It is important to note that the elements contained in these sections are not new concepts, but accepted emergency response activities that are currently addressed in various forms in existing contingency planning regulations. The goal of the NRT is not to create new planning requirements, but to provide a mechanism to consolidate existing concepts into a single functional plan structure. This approach would provide a consistent basis for addressing

[1] LEPC plans are developed by LEPCs in coordination with facility emergency response coordinators under section 303 of the Emergency Planning and Community Right-to-Know Act.

[2] Area Contingency Plans are developed by Area Committees pursuant to section 4202(a)(6) of the Oil Pollution Act of 1990 (OPA).

emergency response concerns as it gains widespread use among facilities.

The introduction section of the plan format is designed to provide facility response personnel, outside responders, and regulatory officials with basic information about the plan and the entity it covers. It calls for a statement of purpose and scope, a table of contents, information on the current revision date of the plan, general facility information, and the key contact(s) for plan development and maintenance. This section should present the information in a brief factual manner.

The structure of the sample core plan and annexes in this guidance is based on the structure of the National Interagency Incident Management System (NIIMS) Incident Command System (ICS). NIIMS ICS is a nationally recognized system currently in use by numerous federal, state, and local organizations (e.g., some Area Committees under OPA). NIIMS ICS is a type of response management system that has been used successfully in a variety of emergency situations, including releases of oil or hazardous substances. NIIMS ICS provides a commonly understood framework that allows for effective interaction among response personnel. Organizing the ICP along the lines of the NIIMS ICS will allow the plan to dovetail with established response management practices, thus facilitating its ease of use during an emergency.

The core plan is intended to contain essential response guidance and procedures. Annexes would contain more detailed supporting information on specific response management functions. The core plan should contain frequent references to the response critical annexes to direct response personnel to parts of the ICP that contain more detailed information on the appropriate course of action for responders to take during various stages of a response. Facility planners need to find the right balance between the amount of information contained in the core plan versus the response critical annexes (Annexes 1 through 3). Information required to support response actions at facilities with multiple hazards will likely be contained in the annexes. Planners at facilities with fewer hazards may choose to include most if not all information in the core plan. Other annexes (e.g., Annexes 4 through 8) are dedicated to providing information that is non-critical at the time of a response (e.g., cross-references to demonstrate regulatory compliance and background planning information). Consistent with the goal of keeping the size of the ICP as manageable as practicable, it is not necessary for a plan holder to provide its field responders with all the compliance documentation (e.g., Annexes 4 through 8) that it submits to regulatory agencies. Similarly, it may not be necessary for a plan holder to submit all annexes to every regulatory agency for review.

Basic headings are consistent across the core plan and annexes to facilitate ease of use during an emergency. These headings provide a comprehensive list of elements to be addressed in the core plan and response annexes and may not be relevant to all facilities. Planners should address those regulatory elements that are applicable to their particular facilities. Planners at facilities with multiple hazards will need to address most, if not all, elements included in this guidance. Planners at facilities with fewer hazards may not need to address certain elements. If planners choose to strictly adopt the ICP outline contained in this guidance but are not required by regulation to address all elements of the outline, they may simply indicate ''not applicable'' for those items where no information is provided. A more detailed discussion of the core plan and supporting annexes follows.

Core Plan

The core plan is intended to reflect the essential steps necessary to initiate, conduct, and terminate an emergency response action: recognition, notification, and initial response, including assessment, mobilization, and implementation. This section of the plan should be concise and easy to follow. A rule of thumb is that the core plan should fit in the glovebox of a response vehicle. The core plan need not detail all procedures necessary under these phases of a response but should provide information that is time critical in the earliest stages of a response and a framework to guide responders through key steps necessary to mount an effective response. The response action section should be convenient to use and understandable at the appropriate skill level.

The NRT recommends the use of checklists or flowcharts wherever possible to capture these steps in a concise easy-to-understand manner. The core plan should be constructed to contain references to appropriate sections of the supporting annexes for more detailed guidance on specific procedures. The NRT anticipates that for a large, complex facility with multiple hazards the annexes will contain a significant amount of information on specific procedures to follow. For a small facility with a limited number of hazard scenarios, the core plan may contain most if not all of the information necessary to carry out the response thus obviating the need for more detailed annexes. The checklists, depending on their size and complexity, can be in either the core or the support section.

The core plan should reflect a hierarchy of emergency response levels. A system of response levels is commonly used in emergency planning for classifying emergencies according to seriousness and assigning an appropriate standard response or series of response actions to each level. Both complex and simple industrial facilities use a system of response levels for rapidly assessing the seriousness of an emergency and developing an appropriate response. This process allows response personnel to match the emergency and its potential impacts with appropriate resources and personnel. The concept of response levels should be considered in developing checklists or flowcharts designed to serve as the basis for the core plan. Note that for those facilities subject to planning requirements under OPA, response levels in the core plan may not necessarily correspond to discharge planning amounts (e.g., average most probable discharge, maximum most probable discharge, and worst case discharge).

Facility owners and operators should determine appropriate response levels based on 1) the need to initiate time-urgent response actions to minimize or prevent unacceptable consequences to the health and safety of workers, the public, or the environment; and 2) the need to communicate critical information concerning the emergency to offsite authorities. The consideration and development of response levels should, to the extent practicable, be consistent with similar efforts that may have been taken by the LEPC, local Area Committee, or mutual aid organization. Response levels, which are used in communications with offsite authorities, should be fully coordinated and use consistent terminology.

Annexes

The annexes are designed to provide key supporting information for conducting an emergency response under the core plan as well as document compliance with regulatory requirements not addressed elsewhere in the ICP. Annexes are not meant to duplicate information that is already contained in the core plan, but to augment core plan information. The annexes should relate to the basic

headings of the core plan. To accomplish this, the annexes should contain sections on facility information, notification, and a detailed description of response procedures under the response management system (i.e, command, operations, planning, logistics, and finance). The annexes should also address issues related to post accident investigation, incident history, written follow-up reports, training and exercises, plan critique and modification process, prevention, and regulatory compliance, as appropriate.

The ICP format contained in this guidance is based on the NIIMS ICS. If facility owners or operators choose to follow fundamental principles of the NIIMS ICS, then they may adopt NIIMS ICS by reference rather than having to describe the system in detail in the plan. The owner or operator should identify where NIIMS ICS documentation is kept at the facility and how it will be accessed if needed by the facility or requested by the reviewing agency. Regardless of the response management system used, the plan should include an organization chart, specific job descriptions,[3] a description of information flow ensuring liaison with the on-scene coordinator (OSC), and a description of how the selected response management system integrates with a Unified Command.[4] If a system other than NIIMS ICS is used, the plan should also identify how it differs from NIIMS or provide a detailed description of the system used.

The NRT anticipates that the use of linkages (i.e., references to other plans) when developing annexes will serve several purposes. Linkages will facilitate integration with other emergency plans within a facility (until such plans can be fully incorporated into the ICP) and with external plans, such as LEPC plans and Area Contingency Plans (ACPs). Linkages will also help ensure that the annexes do not become too cumbersome. The use of references to information contained in external plans does not relieve facilities from regulatory requirements to address certain elements in a facility-specific manner and to have information readily accessible to responders. When determining what information may be linked by reference and what needs to be contained in the ICP, response planners should carefully consider the time critical nature of the information. If instructions or procedures will be needed immediately during an incident response, they should be presented for ready access in the ICP. The following information would not normally be well-suited for reference to documents external to the ICP: core plan elements, facility and locality information (to allow for quick reference by responders on the layout of the facility and the surrounding environment and mitigating actions for the specific hazard(s) present), notification procedures, details of response management personnel's duties, and procedures for establishing the response management system. Although linkages provide the opportunity to utilize information developed by other organizations, facilities should note that many LEPC plans and ACPs may not currently possess sufficient detail to be of use in facility plans or the ICP. This information may need to be developed by the facility until detailed applicable information from broader plans is available.

In all cases, referenced materials must be readily available to anticipated plan users. Copies of documents that have been incorporated by reference need not be submitted unless it is required by regulation. The appropriate sections of referenced documents that are unique to the facility, those that are not nationally recognized, those that are required by regulation, and those that could not reasonably be expected to be in the possession of the reviewing agency, should be provided when the plan is submitted for review and/or approval. Discretion should be used when submitting documents containing proprietary data. It is, however, necessary to identify in the ICP the specific section of the document being incorporated by reference, where the document is kept, and how it will be accessed if needed by the facility or requested by the reviewing agency. In addition, facility owners or operators are reminded to take note of submission requirements of specific regulations when determining what materials to provide an agency for review as it may not be necessary to submit all parts of an ICP to a particular agency.

As discussed previously, this guidance contains a series of matrices designed to assist owners and operators in the plan consolidation process and in the process of ensuring and documenting compliance with regulatory requirements. The matrix in Attachment 2 to this guidance displays areas of current regulations that align with the suggested elements contained in this guidance document. When addressing each element of the ICP outline, plan drafters can refer to this matrix to identify specific regulatory requirements related to that element. The matrices in Attachment 3 to this guidance display regulatory requirements as contained in each of the regulations listed in the NRT policy statement above (which are applicable to many facilities) along with an indication of where in the suggested ICP outline these requirements should be addressed. If a facility chooses to follow the ICP outline, these matrices can be included as Annex 8 to a facility's ICP to provide the necessary cross-reference for plan reviewers to document compliance with various regulatory requirements. To the extent that a plan deviates from the suggested ICP outline, plan drafters will have to alter the matrices to ensure that the location of regulatory requirements within the ICP is clearly identified for plan reviewers.

Integrated Contingency Plan Elements

Presented below is a list of elements to be addressed in the ICP and a brief explanation, displayed in italicized text, of the nature of the information to be contained in that section of the ICP. Attachment 1 presents the complete outline of the ICP without the explanatory text. As discussed previously, the elements are organized into three main sections: plan introduction, core plan, and response annexes.

Section I—Plan Introduction Elements

1. Purpose and Scope of Plan Coverage

This section should provide a brief overview of facility operations and describe in general the physical area, and nature of hazards or events to which the plan is applicable. This brief description will help plan users quickly assess the relevancy of the plan to a particular type of emergency in a given location. This section should also include a list of which regulation(s) are being addressed in the ICP.

[3] OPA 90 planning requirements for marine transfer facilities (33 CFR 154.1035) require job descriptions for each spill management team member regardless of the response management system employed by the facility.

[4] Under NIIMS ICS, the command module has traditionally been represented by a single incident commander (supported by a command staff) who directs efforts of and receives input from the four supporting functional areas (planning, logistics, operations, and finance). More recently, a Unified Command System as described in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) found at 40 CFR part 300 has been used for larger spill responses where the command module is comprised of representatives from the federal government (i.e., federal on-scene coordinator), state government (state on-scene coordinator), and the responsible party working in a cooperative manner. Unified Command allows all parties who have jurisdictional or functional responsibility for the incident to jointly develop a common set of incident objectives and strategies. Such coordination should be guided by procedures found in the NCP (see figure 1a at 40 CFR 300.105(e)(1)) and the applicable Area Contingency Plan.

2. Table of Contents

This section should clearly identify the structure of the plan and include a list of annexes. This will facilitate rapid use of the plan during an emergency.

3. Current Revision Date

This section should indicate the date that the plan was last revised to provide plan users with information on the currency of the plan. More detailed information on plan update history (i.e., a record of amendments) may be maintained in Annex 6 (Response Critique and Plan Review and Modification Process).

4. General Facility Identification Information

a. Facility name
b. Owner/operator/agent (include physical and mailing address and phone number)
c. Physical address of the facility (include county/parish/borough, latitude/longitude, and directions)
d. Mailing address of the facility (correspondence contact)
e. Other identifying information (e.g., ID numbers, SIC Code, oil storage start-up date)
f. Key contact(s) for plan development and maintenance
g. Phone number(s) for key contact(s)
h. Facility phone number
i. Facility fax number

This section should contain a brief profile of the facility and its key personnel to facilitate rapid identification of key administrative information.

Section II - Core Plan Elements

1. Discovery

This section should address the initial action the person(s) discovering an incident will take to assess the problem at hand and access the response system. Recognition, basic assessment, source control (as appropriate), and initial notification of proper personnel should be addressed in a manner that can be easily understood by everybody in the facility. The use of checklists or flowcharts is highly recommended.

2. Initial Response

a. Procedures for internal and external notifications (i.e., contact, organization name, and phone number of facility emergency response coordinator, facility response team personnel, federal, state, and local officials)
b. Establishment of a response management system
c. Procedures for preliminary assessment of the situation, including an identification of incident type, hazards involved, magnitude of the problem, and resources threatened
d. Procedures for establishment of objectives and priorities for response to the specific incident, including:
  (1) Immediate goals/tactical planning (e.g., protection of workers and public as priorities)
  (2) Mitigating actions (e.g., discharge/release control, containment, and recovery, as appropriate)
  (3) Identification of resources required for response
e. Procedures for implementation of tactical plan
f. Procedures for mobilization of resources

This section should provide for activation of the response system following discovery of the incident. It should include an established 24-hour contact point (i.e., that person and alternate who is called to set the response in motion) and instructions for that person on who to call and what critical information to pass. Plan drafters should also consider the need for bilingual notification. It is important to note that different incident types require that different parties be notified. Appropriate federal, State, and local notification requirements should be reflected in this section of the ICP. Detailed notification lists may be included here or in Annex 2, depending upon the variety of notification schemes that a facility may need to implement. For example, the release of an extremely hazardous substance will require more extensive notifications (i.e., to State Emergency Response Commissions (SERCs) and LEPCs) than a discharge of oil. Even though no impacts or awareness are anticipated outside the site, immediate external notifications are required for releases of CERCLA and EPCRA substances. Again, the use of forms, such as flowcharts, checklists, call-down lists, is recommended.

This section should instruct personnel in the implementation of a response management system for coordinating the response effort. More detailed information on specific components and functions of the response management system (e.g., detailed hazard assessment, resource protection strategies) may be provided in annexes to the ICP.

This part of the plan should then provide information on problem assessment, establishment of objectives and priorities, implementation of a tactical plan, and mobilization of resources. In establishing objectives and priorities for response, facilities should perform a hazard assessment using resources such as Material Safety Data Sheets (MSDSs) or the Chemical Hazard Response Information System (CHRIS) manual. Hazardous Materials Emergency Planning Guide (NRT–1), developed by the NRT to assist community personnel with emergency response planning, provides guidance on developing hazard analyses. If a facility elects to provide detailed hazard analysis information in a response annex, then a reference to that annex should be provided in this part of the core plan.

Mitigating actions must be tailored to the type of hazard present. For example, containment might be applicable to an oil spill (i.e., use of booming strategies) but would not be relevant to a gas release. The plan holder is encouraged to develop checklists, flowcharts, and brief descriptions of actions to be taken to control different types of incidents. Relevant questions to ask in developing such materials include:

- *What type of emergency is occurring?*
- *What areas/resources have been or will be affected?*
- *Do we need an exclusion zone?*
- *Is the source under control?*
- *What type of response resources are needed?*

3. Sustained Actions

This section should address the transition of a response from the initial emergency stage to the sustained action stage where more prolonged mitigation and recovery actions progress under a response management structure. The NRT recognizes that most incidents are able to be handled by a few individuals without implementing an extensive response management system. This section of the core plan should be brief and rely heavily on references to specific annexes to the ICP.

4. Termination and Follow-Up Actions

This section should briefly address the development of a mechanism to ensure that the person in charge of mitigating the incident can, in coordination with the federal or state OSC as necessary, terminate the response. In the case of spills, certain regulations may become effective once the ''emergency'' is declared over. The section should describe how the orderly demobilization of response resources will occur. In addition, follow-up actions associated with termination of a response (e.g., accident investigation, response critique, plan review, written follow-up reports) should also be outlined in this section. Plan drafters

may reference appropriate annexes to the ICP in this section of the core plan.

Section III—Annexes

Annex 1. Facility and Locality Information

a. Facility maps
b. Facility drawings
c. Facility description/layout, including identification of facility hazards and vulnerable resources and populations on and off the facility which may be impacted by an incident

This annex should provide detailed information to responders on the layout of the facility and the surrounding environment. The use of maps and drawings to allow for quick reference is preferable to detailed written descriptions. These should contain information critical to the response such as the location of discharge sources, emergency shut-off valves and response equipment, and nearby environmentally and economically sensitive resources and human populations (e.g., nursing homes, hospitals, schools). The ACP and LEPC plan may provide specific information on sensitive environments and populations in the area. EPA Regional Offices, Coast Guard Marine Safety Offices, and LEPCs can provide information on the status of efforts to identify such resources. Plan holders may need to provide additional detail on sensitive areas near the facility. In addition, this annex should contain other facility information that is critical to response and should complement but not duplicate information contained in part 4 of the plan introduction section containing administrative information on the facility.

Annex 2. Notification

a. Internal notifications
b. Community notifications
c. Federal and state agency notifications

This annex should detail the process of making people aware of an incident (i.e., who to call, when the call must be made, and what information/data to provide on the incident). The incident commander is responsible for ensuring that notifications are carried out in a timely manner but is not necessarily responsible for making the notifications. ACPs, Regional Contingency Plans (RCPs), and LEPC plans should be consulted and referenced as a source of information on the roles and responsibilities of external parties that are to be contacted. This information is important to help company responders understand how external response officials fit into the picture. Call-down lists must be readily accessible to ensure rapid response. Notification lists provided in the core plan need not be duplicated here but need to be referenced.

Annex 3. Response Management System

This annex should contain a general description of the facility's response management system as well as contain specific information necessary to guide or support the actions of each response management function (i.e., command, operations, planning, logistics, and finance) during a response.

a. General

If facility owners or operators choose to follow the fundamental principles of NIIMS ICS (see discussion of annexes above), then they may adopt NIIMS ICS by reference rather than having to describe the response management system in detail in the plan. In this section of Annex 3, planners should briefly address either 1) basic areas where their response management system is at variance with NIIMS ICS or 2) how the facility's organization fits into the NIIMS ICS structure. This may be accomplished through a simple organizational diagram.

If facility owners or operators choose not to adopt the fundamental principles of NIIMS ICS, this section should describe in detail the structure of the facility response management system. Regardless of the response management system used, this section of the annex should include the following information:

- *Organizational chart;*
- *Specific job description for each position;*[5]
- *A detailed description of information flow; and*
- *Description of the formation of a unified command within the response management system.*

b. Command

(1) List facility Incident Commander and Qualified Individual (if applicable) by name and/or title and provide information on their authorities and duties.

This section of Annex 3 should describe the command aspects of the response management system that will be used (i.e., reference NIIMS ICS or detail the facility's response management system). The location(s) of predesignated command posts should also be identified.

(2) Information (i.e., internal and external communications).

This section of Annex 3 should address how the facility will disseminate information internally (i.e., to facility/response employees) and externally (i.e., to the public). For example, this section might address how the facility would interact with local officials to assist with public evacuation and other needs. Items to consider in developing this section include press release statement forms, plans for coordination with the news media, community relations plan, needs of special populations, and plans for families of employees.

(3) Safety.

This section of Annex 3 should include a process for ensuring the safety of responders. Facilities should reference responsibilities of the safety officer, federal/state requirements (e.g., HAZWOPER), and safety provisions of the ACP. Procedures for protecting facility personnel should be addressed (i.e., evacuation signals and routes, sheltering in place).

(4) Liaison—Staff Mobilization.

This section of Annex 3 should address the process by which the internal and external emergency response teams will interact. Given that parallel mobilization may be occurring by various response groups, the process of integration (i.e., unified command) should be addressed. This includes a process for communicating with local emergency management especially where safety of the general public is concerned.

c. Operations

(1) Operational response objectives
(2) Discharge or release control
(3) Assessment/monitoring
(4) Containment
(5) Recovery
(6) Decontamination
(7) Non-responder medical needs, including information on ambulances and hospitals
(8) Salvage plans

This section of Annex 3 should contain a discussion of specific operational procedures to respond to an incident. It is important to note that response operations are driven by the type of incident. That is, a response to an oil spill will differ markedly from a response to a release of a toxic gas to the air. Plan drafters should tailor response procedures to the particular hazards in place at the facility. A facility with limited hazards may have relatively few procedures. A larger more complex facility with numerous hazards is likely to have a series of procedures

[5] OPA 90 planning requirements for marine transfer facilities (33 CFR 154.1035) require job descriptions for each spill management team member regardless of the response management system employed by the facility.

designed to address the nuances associated with each type of incident.

d. Planning

(1) Hazard assessment, including facility hazards identification, vulnerability analysis, prioritization of potential risks.

This section of Annex 3 should present a detailed assessment of all potential hazards present at the facility, an analysis of vulnerable receptors (e.g., human populations, both workers and the general public, environmentally sensitive areas, and other facility-specific concerns) and a discussion of which risks deserve primary consideration during an incident. NRT–1 contains guidance on conducting a hazard analysis. Also, ACPs and LEPC plans may provide information on environmentally sensitive and economically important areas, human populations, and protection priorities. Plan drafters should address the full range of risks present at the facility. By covering actions necessary to respond to a range of incident types, plan holders can be prepared for small, operational discharges and large catastrophic releases. One approach that is required by certain regulations, such as the Clean Air Act (CAA) and OPA is to develop planning scenarios for certain types and sizes of releases (i.e., worst case discharge). Facilities may address such planning scenarios and associated calculations in this section of Annex 3 or as part of a separate annex depending on the size and complexity of the facility.

(2) Protection

This section of Annex 3 should present a discussion of strategies for protecting the vulnerable receptors identified through the hazard analysis. Primary consideration should be given to minimizing those risks identified as a high priority. Activities to be considered in developing this section include: population protection; protective booming; dispersant use, in-situ burning, bioremediation; water intake protection; wildlife recovery/ rehabilitation; natural remediation; vapor suppression; and monitoring, sampling, and modeling. ACPs and LEPC plans may contain much of this information.

(3) Coordination with natural resource trustees.

This section should address coordination with government natural resource trustees. In their role as managers of and experts in natural resources, trustees assist the federal OSC in developing or selecting removal actions to protect these resources. In this role, they serve as part of the response organization working for the federal OSC. A key area to address is interaction with facility response personnel in protection of natural resources.

Natural resource trustees are also responsible to act on behalf of the public to present a claim for and recover damages to natural resources injured by an oil spill or hazardous substance release. The process followed by the natural resource trustees, natural resource damage assessment (NRDA), generally involves some data collection during emergency response. NRDA regulations provide that the process may be carried out in cooperation with the responsible party. Thus, the facility may wish to plan for how that cooperation will occur, including designation of personnel to work with trustees in NRDA.

(4) Waste management.

This section should address procedures for the disposal of contaminated materials in accordance with federal, state, and local requirements.

e. Logistics

(1) Medical needs of responders
(2) Site security
(3) Communications (internal and external resources)
(4) Transportation (air, land, water)
(5) Personnel support (e.g., meals, housing, equipment)
(6) Equipment maintenance and support

This section of the Annex 3 should address how the facility will provide for the operational needs of response operations in each of the areas listed above. For example, the discussion of personnel support should address issues such as: volunteer training; management; overnight accommodations; meals; operational/ administrative spaces; and emergency procedures. The NRT recognizes that certain logistical considerations may not be applicable to small facilities with limited hazards.

f. Finance/procurement/administration

(1) Resource list
(2) Personnel management
(3) Response equipment
(4) Support equipment
(5) Contracting
(6) Claims procedures
(7) Cost documentation

This section of Annex 3 should address the acquisition of resources (i.e., personnel and equipment) for the response and monitoring of incident-related costs. Lists of available equipment in the local and regional area and how to procure such equipment as necessary should be included. Information on previously established agreements (e.g., contracts) with organizations supplying personnel and equipment (e.g., oil spill removal organizations) also should be included. This section should also address methods to account for resources expended and to process claims resulting from the incident.

Annex 4. Incident Documentation

a. Post accident investigation
b. Incident history

This annex should describe the company's procedures for conducting a follow-up investigation of the cause of the accident, including coordination with federal, State, and local officials. This annex should also contain an accounting of incidents that have occurred at the facility, including information on cause, amount released, resources impacted, injuries, response actions, etc. This annex should also include information that may be required to prove that the facility met its legal notification requirements with respect to a given incident, such as a signed record of initial notifications and certified copies of written follow-up reports submitted after a response.

Annex 5. Training and Exercises/Drills

This annex should contain a description of the training and exercise program conducted at the facility as well as evidence (i.e., logs) that required training and exercises have been conducted on a regular basis. Facilities may follow appropriate training or exercise guidelines (e.g., National Preparedness for Response Exercise Program Guidelines) as allowed under the various regulatory requirements.

Annex 6. Response Critique and Plan Review and Modification Process

This annex should describe procedures for modifying the plan based on periodic plan review or lessons learned through an exercise or a response to an actual incident. Procedures to critique an actual or simulated response should be a part of this discussion. A list of plan amendments (i.e., history of updates) should also be contained in this annex. Plan modification should be viewed as a part of a facility's continuous improvement process.

Annex 7. Prevention

Some federal regulations that primarily address prevention of accidents include elements that relate to contingency planning (e.g., EPA's RMP and SPCC regulations and OSHA's Process Safety Standard). This annex is designed to allow facilities to include

prevention-based requirements (e.g., maintenance, testing, in-house inspections, release detection, site security, containment, fail safe engineering) that are required in contingency planning regulations or that have the potential to impact response activities covered in a contingency plan. The modular nature of the suggested plan outline provides planners with necessary flexibility to include prevention requirements in the ICP. This annex may not need to be submitted to regulatory agencies for review.

Annex 8. Regulatory Compliance and Cross-Reference Matrices

This annex should include information necessary for plan reviewers to determine compliance with specific regulatory requirements. To the extent that plan drafters did not include regulatory required elements in the balance of the ICP, they should be addressed in this annex. This annex should also include signatory pages to convey management approval and certifications required by the regulations, such as certification of adequate response resources and/or statements of regulatory applicability as required by regulations under OPA authority. Finally, this annex should contain cross-references that indicate where specific regulatory requirements are addressed in the ICP for each regulation covered under the plan. As discussed previously, Attachment 3 contains a series of matrices designed to fulfill this need in those instances where plan drafters adhere to the outline contained in this guidance.

Attachment 1—ICP Outline

Section I—Plan Introduction Elements

1. Purpose and Scope of Plan Coverage
2. Table of Contents
3. Current Revision Date
4. General Facility Identification Information
   a. Facility name
   b. Owner/operator/agent (include physical and mailing address and phone number)
   c. Physical address of the facility (include county/parish/borough, latitude/longitude, and directions)
   d. Mailing address of the facility (correspondence contact)
   e. Other identifying information (e.g., ID numbers, SIC Code, oil storage start-up date)
   f. Key contact(s) for plan development and maintenance
   g. Phone number for key contact(s)
   h. Facility phone number
   i. Facility fax number

Section II—Core Plan Elements

1. Discovery
2. Initial Response
   a. Procedures for internal and external notifications (i.e., contact, organization name, and phone number of facility emergency response coordinator, facility response team personnel, federal, state, and local officials)
   b. Establishment of a response management system
   c. Procedures for preliminary assessment of the situation, including an identification of incident type, hazards involved, magnitude of the problem, and resources threatened
   d. Procedures for establishment of objectives and priorities for response to the specific incident, including:
   (1) Immediate goals/tactical planning (e.g., protection of workers and public as priorities)
   (2) Mitigating actions (e.g., discharge/release control, containment, and recovery, as appropriate)
   (3) Identification of resources required for response
   e. Procedures for implementation of tactical plan
   f. Procedure for mobilization of resources
3. Sustained Actions
4. Termination and Follow-Up Actions

Section III-Annexes

Annex 1. Facility and Locality Information

a. Facility maps
b. Facility drawings
c. Facility description/layout, including identification of facility hazards and vulnerable resources and populations on and off the facility which may be impacted by an incident

Annex 2. Notification

a. Internal notifications
b. Community notifications
c. Federal and state agency notifications

Annex 3. Response Management System

a. General
b. Command
   (1) List facility Incident Commander and Qualified Individual (if applicable) by name and/or title and provide information on their authorities and duties
   (2) Information (i.e., internal and external communications)
   (3) Safety
   (4) Liaison—Staff mobilization
c. Operations
   (1) Operational response objectives
   (2) Discharge or release control
   (3) Assessment/monitoring
   (4) Containment
   (5) Recovery
   (6) Decontamination
   (7) Non-responder medical needs including information on ambulances and hospitals
   (8) Salvage plans
d. Planning
   (1) Hazard assessment, including facility hazards identification, vulnerability analysis, prioritization of potential risks
   (2) Protection
   (3) Coordination with natural resource trustees
   (4) Waste management
e. Logistics
   (1) Medical needs of responders
   (2) Site security
   (3) Communications (internal and external resources)
   (4) Transportation (air, land, water)
   (5) Personnel support (e.g., meals, housing, equipment)
   (6) Equipment maintenance and support
f. Finance/procurement/administration
   (1) Resource list
   (2) Personnel management
   (3) Response equipment
   (4) Support equipment
   (5) Contracting
   (6) Claims procedures
   (7) Cost documentation

Annex 4. Incident Documentation

a. Post accident investigation
b. Incident history

Annex 5. Training and Exercises/Drills

Annex 6. Response Critique and Plan Review and Modification Process

Annex 7. Prevention

Annex 8. Regulatory Compliance and Cross-Reference Matrices

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Attachment 2: ICP Development Matrix

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
Section I - Plan Introduction Elements							
1. Purpose and scope of plan coverage	264.51 265.51 279.52(b)(1) 264.52(a) 265.52(a) 279.52(b)(2)(i)				38(a)(1)[1] 119(n) 272(d)	(l)[2] (p)(8) (q)(1)	
2. Table of contents		112.20(h) **Appendix F**	1035(a)(4)[3] 1030(b)	**Appendix A**			
3. Current revision date		**F1.2**	1035(a)(6)				
4. General facility identification information		**F1.2** **F1.9**		194.107(d)(1)(i) 194.113 194.113(b)(1)			
a. Facility name		**F1.2**	1035(a)(1)				
b. Owner/operator/ agent		112.20(h)(2) **F1.2** **F2.0**	1035(a)(3)	194.113(a)(1) **A-1**			
c. Physical address and directions		112.20(h)(2) **F1.2** **F2.0**	1035(a)(1) 1035(a)(2) 1035(e)	194.113(a)(2) 194.113(b)(3),(4) **A-1**			
d. Mailing address		112.20(h)(2)	1035(a)(1)	194.113(a)(1)			
e. Other identifying information							

[1] All citations refer to part 1910 unless otherwise noted.
[2] All citations refer to 29 CFR 1910.120 unless otherwise noted.
[3] All citations refer to part 154 unless otherwise noted.

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
f. Key contact(s) for plan development and maintenance					38(a)(2)(vi)	(l)(2)(i),(ii) (p)(8)(ii)(A),(B) (q)(2)(i),(ii)	
g. Phone number for key contact(s)							
h. Facility phone number		**F1.2** **F2.1**	1035(a)(1)				
i. Facility fax number			1035(a)(1)				
Section II - Core Plan Elements							
1. Discovery		112.20(h)(6) **F1.6.1, F1.6.2**	1035(b)(3)(i)	194.107(d)(1)(iii) **A-3**	119(n)	(l)(2)(iii) (p)(8)(ii)(C) (q)(2)(iii)	68.95(a)(1)(iii)
2. Initial response		112.20(h)(7)(i) **F1.3.6** **F1.7**	1035(b)(2)(ii) 1035(b)(3)(i) 1035(b)(3)(ii)	**A-2**	38(a)(2)(i) 38(a)(2)(ii) 119(n)	(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	68.95(a)(1)(iii)
a. Procedures for internal and external notifications	264.52(d) 265.52(d) 279.52(b)(2)(iv) 264.55 265.55 279.52(b)(5) 264.56(a)(1),(2) 265.56(a)(1),(2) 279.52(b)(6)(i)(A),(B) 264.56(d)(1),(2) 265.56(d)(1),(2) 279.52(b)(6)(iv)(A),(B)	112.20(h)(1)(iii) 112.20(h)(3)(iii) 112.20(h)(3)(iii) 112.20(h)(3)(iv) **F1.2** **F1.3.1**	1026 1035(a)(3) 1035(b)(1)(i) 1035(e)(2)	194.107(d)(1)(ii) 194.113(b)(2) **A-1, A-1(b)(2)** **A-2** **A-5**	38(a)(2)(v) 38(a)(2)(vi) 38(a)(3)(i) 38(a)(3)(ii) 165	(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	68.95(a)(1)(i)
b. Establishment of a response management structure	264.37 265.37 279.52(a)(6) 264.52(c) 265.52(c) 279.52(b)(2)(iii)	112.20(h)(1)(v) 112.20(h)(3)(v) **F1.3.4**	1035(b)(3)(iii)	194.107(d)(1)(v) **A-4** **A-9**		(l)(2)(i),(ii) (p)(8)(ii)(A),(B) (q)(2)(i),(ii) (q)(3)(i)	
c. Preliminary assessment	264.56(b),(c) 265.56(b),(c) 279.52(b)(6)(ii),(iii)	112.20(h)(3)(ix) 112.20(h)(4) **F1.4, F1.4.2**	1035(b)(3) 1035(b)(4)(i)	194.107(d)(1)(ii)	38(a)(2)(i) 38(a)(2)(ii)	(l)(2)(i) (l)(3)(vii) (p)(8)(ii)(A) (q)(2)(i) (q)(3)(ii),(iii)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
d. Establishment of objectives and priorities for response, including: **(1) Immediate goals/ tactical planning** **(2) Mitigating actions** **(3) Response resources**	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(1)(iv) 112.20(h)(1)(vii) 112.20(h)(3)(vi) 112.20(h)(3)(ix) 112.20(h)(7) **F1.3.2** **F1.7.1, F1.7.3**	1035(b)(2) 1035(b)(3)(iv),(v)	194.107(d)(1)(iii) 194.107(d)(1)(v)	38(a)(4) 119(n)	(l)(2)(vi),(viii) (p)(8)(ii)(F),(H) (q)(2)(vi),(viii) (p)(8)(iv)(F) (q)(3)(ii),(iii),(iv),(vi),(vii)	
e. Implementation of tactical plan	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(3)(ix) 112.20(h)(7)	1035(b)(2)(iii) 1035(b)(3) 1035(b)(4)(iii)	194.107(d)(1)(v) **A-3**	38(a)(2)(ii)	(l)(3)(vii) (p)(8)(iv)(F) (q)(3)(iii)	
f. Mobilization of resources	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(7) **F1.7.1**	1035(b)(2)(iii) 1035(b)(3) 1035(b)(4)(iii)	194.115 194.107(d)(1)(v) **A-1** **A-3**		(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	
3. Sustained actions		112.20(h)(7)	1035(b)(3)	194.107(d)(1)(v) **A-9**	38(a)(2)(iii)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	68.95(a)(1)(iii)
4. Termination and follow-up actions	264.56(i) 265.56(i)	112.20(h)(7)	1035(b)(3)			(l)(2)(ix) (p)(8)(ii)(I) (q)(2)(ix)	68.95(a)(1)(iii)
Section III - Annexes							
1. Facility and locality information		112.20(h)(2) **F1.2** **F2.0**	1035(a) 1035(e)(1)	194.107(d)(1)(i) 194.113 194.113(b)(1)			
a. Facility maps		112.20(h)(1)(viii) **F1.9**		194.113(b)(2) **A-9**			
b. Facility drawings		112.20(h)(1)(viii) 112.20(h)(9) **F1.9**	1035(e)	**A-9**			
c. Facility description/ layout		**F1.9**	1035(b)(4)	**A-9**		(l)(3)(i)(A) (p)(8)(iv)(A)(1)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
2. Notification	264.52(d) 265.52(d) 279.52(b)(2)(iv) 264.56(a)(1),(2) 265.56(a)(1),(2) 279.52(b)(6)(i)(A),(B) 264.56(d)(1),(2) 265.56(d)(1),(2) 279.52(b)(6)(iv)(A),(B)	112.20(h)(1)(ii)		194.107(d)(1)(ii) **A-2**	119(n) 165(b)(1) 165(b)(4) 272(d)	(l)(3)(i)(B) (l)(2)(ix) (p)(8)(ii)(I) (p)(8)(iv)(A)(2) (q)(2)(ix)	68.95(a)(1)(i)
a. Internal		112.20(h)(3)(iii) **F1.3.1**	1035(b)(1)(i) 1035(b)(1)(ii) 1035(e)(2)	194.107(d)(1)(iv)	119(n) 165(b)(1)	(l)(2)(ix) (q)(2)(ix) (p)(8)(ii)**(I)**	
b. Community		112.20(h)(3)(iii) 112.20(h)(3)(ix) **F1.3.1**	1035(b)(1)(i) 1035(b)(1)(ii) 1035(e)(2)		119(n)	(l)(2)(i),(ii),(ix) (p)(8)(ii)(A),(B), **(I)** (q)(2)(i),(ii),(ix)	
c. Federal and state agency		112.20(h)(3)(iii) 112.20(h)(3)(ix) **F1.3.1**	1035(b)(1)(i) 1035(b)(1)(ii) 1035(e)(2)	194.107(d)(1)(vi)		(l)(2)(i),(ii),(ix) (p)(8)(ii)(A),(B),(I) (q)(2)(i),(ii),(ix)	
3. Response management structure		112.20(h)(1)(v) 112.20(h)(3)(v) **F1.3.4**	1035(b)(3)(iii)	194.107(d)(1)(v) **A-9**		(q)(3)(i)	
a. General	264.52(c) 265.52(c) 279.52(b)(2)(iii)		1035(b)(3)(iii)			(q)(3)(i)	
b. Command		112.20(h)(3)(iv)				(q)(3)(i)	
(1) Facility incident commander and qualified individual	264.55 265.55 279.52(b)(5)	112.20(h)(1)(i) **F1.2.5**	1026	**A-4**		(q)(3)(i)	
(2) Information	264.56(a)(1),(2) 265.56(a)(1),(2) 279.52(b)(6)(i)(A),(B)	112.20(h)(3)(iii)	1035(b)(3)(iii) 1035(e)(4)	194.107(d)(1)(v) **A-2**	38(a)(2)(vi) 38(a)(5)(iii)	(q)(3)(i)	
(3) Safety	264.52(f) 265.52(f) 279.52(b)(2)(vi)	112.20(h)(1)(vi) 112.20(h)(3)(vii) 112.20(h)(3)(viii) **F1.3.5**	1035(b)(3)(iii) 1035(e)(5)		38(a)(2)(i) 38(a)(2)(iii) 38(a)(2)(iv) 38(a)(4)	(l)(2)(iv),(vi) (p)(8)(ii)(D),(F) (q)(2)(iv),(vi) (q)(3)(vii),(viii)	
(4) Liaison			1035(b)(3)(iii)		38(a)(2)(vi)	(l)(2)(i),(ii) (p)(8)(ii)(A),(B) (q)(2)(i),(ii)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
c. Operations			1035(b)(3)(iii)	194.107(d)(1)(v)	38(a)(2)(i)-(iv)	(q)(3)(iii),(v)	
(1) Response objectives			1035(b)(2)(iii) 1035(b)(4)(iii)		38(a)(1)	(q)(3)(iii)	
(2) Discharge or release control	264.56(e) 265.56(e) 279.52(b)(6)(v)	112.20(h)(3)(i) 112.20(h)(7)(iv) 112.20(h)(1)(vii)	1035(b)(2) 1035(b)(2)(iii) 1035(b)(4)(iii)	194.107(d)(1)(v) **A-3**			
(3) Assessment/ monitoring	264.56(b),(c),(d),(f) 265.56(b),(c),(d),(f) 279.52(b)(6)(ii),(iii), (iv),(vi)	112.20(h)(3)(ix) **F1.7.1**	1035(b)(2)(iii) 1035(b)(3) 1035(b)(4)(iii)		38(a)(3)(ii) 38(a)(4)	(q)(3)(ii)	
(4) Containment	264.56(e) 265.56(e) 279.52(b)(6)(v)	112.20(h)(1)(vii) 112.20(h)(3)(i) 112.20(h)(7)(iv) **F1.7.3**	1035(b)(2)(iii) 1035(b)(3)(iv) 1035(b)(4)(iii)	194.107(d)(1)(v)			
(5) Recovery		112.20(h)(3)(i) 112.20(h)(7)(iii) **F1.7.2**	1035(b)(2)(iii) 1035(b)(3)(iv) 1035(b)(4)(iii)	194.107(d)(1)(v)			
(6) Decontamination	264.56(h)(2) 265.56(h)(2) 279.52(b)(6)(viii)(B)	112.20(h)(7)(iii) **F1.7.2**		194.107(d)(1)(v)		(k) (l)(2)(vii) (p)(8)(ii)(G) (q)(2)(vii) (q)(3)(ix)	
(7) Non-responder medical needs			1035(e)(5)		38(a)(2)(iv)	(l)(2)(viii) (p)(8)(ii)(H) (q)(2)(viii)	68.95(a)(1)(ii)
(8) Salvage plans				194.107(d)(1)(v)			
d. Planning				194.107(a) 194.115	38(a)(1) 38(a)(4)	(l)(2)(i),(ix) (p)(8)(ii)(A),(I) (q)(1) (q)(2)(i),(ix)	
(1) Hazard assessment		112.20(h)(3)(ix) 112.20(h)(4) 112.20(h)(5) 112.20(h)(7)(ii) **F1.4.1-F1.4.3** **F1.5.1, F1.5.2**	1029 1035(b)(4)(ii)	194.105 194.113(b)(6)	38(a)(4)	(l)(1)(ii)(C),(D) (p)(8)(iv)(A)(1),(F) (q)(3)(iii)	68.20-36 68.50 68.67
(2) Protection		112.20(h)(7)(i) 112.20(h)(7)(iv) **F1.7.1, F1.7.3**	1035(b)(4)			(l)(2)(iv),(v),(vi) (p)(8)(ii)(D),(E),(K) (q)(2)(iv),(v),(vi) (q)(3)(iii)	

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
(3) Coordination with natural resource trustees		112.20(g)	1030(f)	194.107(c)			
(4) Waste management	264.56(h)(1) 265.56(h)(1) 279.52(b)(6)(viii)(A) 264.56(g) 265.56(g) 279.52(b)(6)(vii)	112.20(h)(7)(iv) **F1.7.2**	1035(b)(5)	194.107(d)(1)(v)			
e. Logistics			1035(b)(3)(iii)			(l)(3)(iii) (p)(8)(iv)(B) (q)(2)(xii)	
(1) Medical needs			1035(e)(5)		38(a)(2)(iv)	(l)(2)(viii) (p)(8)(ii)(H) (q)(2)(viii)	68.95(a)(1)(ii)
(2) Site security		112.20(h)(10) **F1.10**				(l)(2)(v) (p)(8)(ii)(E) (q)(2)(v)	
(3) Communications		112.20(h)(1)(iv) 112.20(h)(3)(vi) **F1.3.2**	1035(e)(3)	194.107(d)(1)(v) **A-2**	38(a)(3) 119(e)(3)(iii) 165(b)	(q)(3)(i)	
(4) Transportation							
(5) Personnel support		112.20(h)(1)(v) 112.20(h)(1)(vi) 112.20(h)(3)(i-ii) 112.20(h)(3)(v) 112.20(h)(3)(vii) **F1.3.5**			38(a)(5)(i)	(l)(2)(ii) (p)(8)(ii)(B) (q)(2)(ii) (q)(3)(v),(vi)	
(6) Equipment maintenance and support		112.20(h)(1)(iv) 112.20(h)(3)(vi) 112.20(h)(8) **F1.3.3** **F1.8.1**	1035(b)(3)(iv) 1035(e)(3) 1057	194.107(d)(1)(viii)	119(j)(4) 119(j)(5) 165(d)	(l)(2)(xi) (p)(8)(ii)(K) (q)(2)(xi)	68.95(a)(2)
f. Finance/procurement/ administration		112.20(h)(3)(ix)	1028 1035(b)(3)(iii)				
(1) Resource list	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(1)(iv) 112.20(h)(3)(vi) **F1.3.2** **F1.7.1**	1035(b)(3)(iv) 1035(e)(3)				
(2) Personnel		112.20(h)(1)(v) 112.20(h)(3)(v) **F1.3.4**	1035(b)(3)(iv)				

ICP Elements	RCRA (40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52)	EPA's Oil Pollution Prevention Regulation (40 CFR part 112)	USCG-FRP (33 CFR part 154)	DOT/RSPA-FRP (49 CFR part 194)	OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	OSHA HAZWOPER (29 CFR 1910.120)	CAA RMP (40 CFR part 68)
(3) Response equipment	264.52(e) 265.52(e) 279.52(b)(2)(v)	112.20(h)(1)(iv) 112.20(h)(3)(vi) **F1.3.2** **F1.7.1**	1035(b)(2)(ii) 1035(b)(4)(iii) 1035(e)(3) **Appendix C**			(l)(2)(xi) (p)(8)(ii)(K) (q)(2)(xi)	
(4) Support equipment	264.52(e) 265.52(e) 279.52(b)(2)(v)	**F1.3.2** **F1.7.1**	1035(e)(3)				
(5) Contracting		112.20(h)(3)(ii)	1028(a)(1) 1035(e)(3)	194.115			
(6) Claims procedures							
(7) Cost documentation							
4. Incident documentation					38(a)(2)(iii) 119(e)(3)(ii)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	
a. Post-accident investigation	264.56(j) 265.56(j) 279.52(b)(6)(ix)				119(m)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	68.60 68.81
b. Incident history		112.20(h)(4) **F1.4.4**			119(e)(3)(ii)		68.42
5. Training and exercises/drills		112.20(h)(8) 112.21 **F1.8.2, F1.8.3**	1035(c) 1050 1055 **Appendix D**	194.107(d)(1)(vii) 194.107(d)(1)(ix) 194.117 **A-6** **A-7**	38(a)(5) 119(g)(1)(i)	(l)(3)(iv) (p)(8)(iii) (q)(6)	68.95(a)(3)
6. Response critique and plan review and modification process	264.54 265.54 279.52(b)(4)	112.20(g)	1035(a)(6) 1035(d) 1065	194.107(d)(1)(x) 194.111 194.119 194.121 **A-8**	119(l) 119(o)(1)	(l)(2)(x) (p)(8)(ii)(J) (q)(2)(x)	68.95(a)(4)
7. Prevention						(l)(2)(iii) (p)(8)(ii)(C) (q)(2)(iii)	

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ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES

	ICP Citation(s)
RCRA (40 CFR Part 264 Subpart D [1], 40 CFR Part 265 Subpart D [2], 40 CFR Part 279.52(b) [3])	
264.52 Content of contingency plan:	
(a) Emergency response actions.[4]	
(b) Amendments to SPCC plan.	
(c) Coordination with State and local response parties [5]	II.2.b;III.3.a.
(d) Emergency coordinator(s)	II.2.a; III.2.
(e) Detailed description of emergency equipment on-site	II.2.d.(3); II.2.e; II.2.f; III.3.f.(1); III.3.f.(3); III.3.f.(4).
(f) Evacuation plan if applicable	III.3.b.(3).
264.53 Copies of contingency plan.	
264.54 Amendment of contingency plan	III.6.
264.55 Emergency coordinator	II.2.a; III.3.b.(1).
264.56 Emergency procedures:	
(a) Notification	II.2.a; III.2; III.3.b.(2).
(b) Emergency identification/characterization	II.2.c; III.3.c.(3).
(c) Health/environmental assessment	II.2.c; III.3.c.(3).
(d) Reporting	II.2.a; III.2; III.3.c.(3).
(e) Containment	III.3.c.(2); III.3.c.(4).
(f) Monitoring	III.3.b.(3); III.3.c.(3).
(g) Treatment, storage, or disposal of wastes	III.3.d.(4).
(h) Cleanup procedures:.	
(1) Disposal	III.3.d.(4).
(2) Decontamination	III.3.c.(6).
(i) Follow-up procedures	II.4.
(j) Follow-up report	III.4.a.
265.52 Content of contingency plan:	
(a) Emergency response actions.[6]	
(b) Amendments to SPCC plan.	
(c) Coordination with State and local response parties [7]	II.2.b; III.3.a.
(d) Emergency coordinator(s)	II.2.a; III.2.
(e) Detailed description of emergency equipment on-site	II.2.d.(3); II.2.e; II.2.f; III.3.f.(1); III.3.f.(3); III.3.f.(4).
(f) Evacuation plan if applicable	III.3.b.(3).
265.53 Copies of contingency plan.	
265.54 Amendment of contingency plan	III.6.
265.55 Emergency coordinator	II.2.a; III.3.b.(1).
265.56 Emergency procedures:	
(a) Notification	II.2.a; III.2; III.3.b.(2).
(b) Emergency identification/characterization	II.2.c; III.3.c.(3).
(c) Health/environmental assessment	II.2.c; III.3.c.(3).
(d) Reporting	II.2.a; III.2; III.3.c.(3).
(e) Containment	III.3.c.(2); III.3.c.(4).
(f) Monitoring	III.3.b.(3); III.3.c.(3).
(g) Treatment, storage, or disposal of wastes	III.3.d.(4).
(h) Cleanup procedures:	
(1) Disposal	III.3.d.(4).
(2) Decontamination	III.3.c.(6).
(i) Follow-up procedures	II.4.
(j) Follow-up report	III.4.a.
279.52(b)(2) Content of contingency plan:	
(i) Emergency response actions [8]	
(ii) Amendments to SPCC plan.	
(iii) Coordination with State and local response parties [9]	II.2.b; III.3.a.
(iv) Emergency coordinator(s)	II.2.a; III.2.
(v) Detailed description of emergency equipment on-site	II.2.d.(3); II.2.e; II.2.f; III.3.f.(1); III.3.f.(3); III.3.f(4).
(vi) Evacuation plan if applicable	III.3.b.(3).
(3) Copies of contingency plan.	
(4) Amendment of contingency plan	III.6.
(5) Emergency coordinator	II.2.a; III.3.b.(1).
(6) Emergency procedures:	
(i) Notification	II.2.a; III.2; III.3.b.(2).
(ii) Emergency identification/characterization	II.2.c; III.3.c.(3).
(iii) Health/environmental assessment	II.2.c; III.3.c.(3).
(iv) Reporting	II.2.a; III.2; III.3.c.(3).
(v) Containment	III.3.c.(2); III.3.c.(4).
(vi) Monitoring	III.3.b.(3); III.3.c.(3).
(vii) Treatment, storage, or disposal of wastes	III.3.d.(4).
(viii) Cleanup procedures:	
(A) Disposal	III.3.d.(4).
(B) Decontamination	III.3.c.(6).

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(ix) Follow-up report	III.4.a.
EPA's Oil Pollution Prevention Regulation (40 CFR 112)	
112.7(d)(1) Strong spill contingency plan and written commitment of manpower, equipment, and materials.[10,11]	
112.20(g) General response planning requirements	III.3.d.(3); III.6.
112.20(h) Response plan elements	I.2; III.8.
(1) Emergency response action plan (Appendix F1.1):	
(i) Identity and telephone number of qualified individual (F1.2.5)	III.3.b.(1).
(ii) Identity of individuals/organizations to contact if there is a discharge (F1.3.1)	III.2.
(iii) Description of information to pass to response personnel in event of a reportable spill (F1.3).	II.2.a.
(iv) Description of facility's response equipment and its location (F1.3.2)	II.2.d.(3); III.3.e.(3); III.3.e.(6); III.3.f.(1); III.3.f.(3).
(v) Description of response personnel capabilities (F1.3.4)	II.2.b; III.3; III.3.e.(5); III.3.f.(2);
(vi) Plans for evacuation of the facility and a reference to community evacuation plans (F1.3.5).	III.3.b.(3); III.3.e.(5)
(vii) Description of immediate measures to secure the source (F1.7.1)	II.2.d.(2); III.3.c.(2); III.3.c.(4).
(viii) Diagram of the facility (F1.9)	III.1.a–b.
(2) Facility information (F1.2, F2.0)	I.4.b–d; III.1.
(3) Information about emergency responses:	
(i) Identity of private personnel and equipment to remove to the maximum extent practicable a WCD or other discharges (F1.3.2, F1.3.4).	III.3.c.(2); III.3.c.(4)–(5); III.3.e.(5).
(ii) Evidence of contracts or other approved means for ensuring personnel and equipment availability.	III.3.e.(5); III.3.f.(5)
(iii) Identity and telephone of individuals/organizations to be contacted in event of a discharge (F1.3.1).	II.2.a; III.2.b–d; III.3.b.(2).
(iv) Description of information to pass to response personnel in event of a reportable spill (F1.3.1).	II.2.a.
(v) Description of response personnel capabilities (F1.3.4)	II.2.b; III.3; III.3.e.(5); III.3.f.(2).
(vi) Description of a facility's response equipment, location of the equipment, and equipment testing (F1.3.2, F1.3.3).	II.2.d.(3); III.3.e.(3); III.3.e.(6); III.3.f.(1); III.3.f.(3).
(vii) Plans for evacuation of the facility and a reference to community evacuation plans as appropriate (F1.3.5).	III.3.b.(3); III.3.e.(5).
(viii) Diagram of evacuation routes (F1.9).	III.3.b.(3).
(ix) Duties of the qualified individual (F1.3.6)	II.2.c; II.2.d.(1); I.2.e; III.2.b–c; III.3.c.(3); III.3.d.(1); III.3.f.
(4) Hazard evaluation (F1.4)	II.2.c; III.3.d.(1); III.4.b.
(5) Response planning levels (F1.5, F1.5.1, F1.5.2)	II.3.d.(1).
(6) Discharge detection systems (F1.6, F1.6.1, F1.6.2)	II.1.
(7) Plan implementation (F1.7)	II.2.d–f; II.3; II.4.
(i) Response actions to be carried out (F1.7.1.1)	II.2; III.3.d.(2).
(ii) Description of response equipment to be used for each scenario (F1.7.1.1)	III.3.d.(1).
(iii) Plans to dispose of contaminated cleanup materials (F1.7.2)	III.3.c.(5)–(6)
(iv) Measures to provide adequate containment and drainage of spilled oil (F1.7.3)	III.3.c.(2); III.3.c.(4); III.3.d.(2); III.3.d.(4).
(8) Self-inspection, drills/exercises, and response training (F1.8.1–F1.8.3.2)	III.3.e.(6); III.5.
(9) Diagrams (F1.9)	III.1.b.
(10) Security systems (F1.10)	III.3.e.(2).
(11) Response plan cover sheet (F2.0).	
112.21 Facility response training and drills/exercises (F1.8.2, F1.8.3)	III.5.
Appendix F Facility-Specific Response Plan:[12]	I.2.
1.0 Model Facility-Specific Response Plan.	
1.1 Emergency Response Action Plan.	
1.2 Facility Information	I.3; I.4.a; I.4.b–c; I.4.h; II.2.a; III.1.
1.3 Emergency Response Information:	
1.3.1 Notification	II.2.a; III.2.a–c.
1.3.2 Response Equipment List	II.2.d.(3); III.3.e.(3); III.3.f.(1); III.3.f.(3)–(4).
1.3.3 Response Equipment Testing/Deployment	III.3.e.(6).
1.3.4 Personnel	II.2.b; III.3; III.3.f.(2).
1.3.5 Evacuation Plans	III.3.b.(3); III.3.e.(5).
1.3.6 Qualified Individual's Duties	II.2.
1.4 Hazard Evaluation	II.2.c.
1.4.1 Hazard Identification	III.1.c; III.3.d.(1).
1.4.2 Vulnerability Analysis	II.2.c; III.3.d.(1).
1.4.3 Analysis of the Potential for an Oil Spill	III.3.d.(1).
1.4.4 Facility Reportable Oil Spill History	III.4.b.
1.5 Discharge Scenarios:	
1.5.1 Small and Medium Discharges	III.3.d.(1).
1.5.2 Worst Case Discharge	III.3.d.(1).
1.6 Discharge Detection Systems:	
1.6.1 Discharge Detection By Personnel	II.1.

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
1.6.2 Automated Discharge Detection	II.1.
1.7 Plan Implementation	II.2.
1.7.1 Response Resources for Small, Medium, and Worst Case Spills	II.2.d.(3); II.2.f; III.3.c.(3); III.3.d.(2); III.3.f.(1); III.3.f.(3)–(4).
1.7.2 Disposal Plans	III.3.c.(5)–(6); III.3.d.(4).
1.7.3 Containment and Drainage Planning	II.2.d; III.3.c.(4); III.3.d.(2).
1.8 Self-Inspection, Drills/Exercises, and Response Training:	
1.8.1 Facility Self-Inspection	III.3.e.(6).
1.8.2 Facility Drills/Exercises	III.5.
1.8.3 Response Training	III.5.
1.9 Diagrams	I.4; III.1.a–c.
1.10 Security	III.3.e.(2).
2.0 Response Plan Cover Sheet	I.4.b; I.4.c; I.4.h; III.1.
USCG FRP (33 CFR part 154)	
154.1026 Qualified individual and alternate qualified individual	II.2.a; III.3.b.(1).
154.1028 Availability of response resources by contract or other approved means	III.3.f or III.8; III.3.f.(5).
154.1029 Worst case discharge	III.3.d.(1).
154.1030 General response plan contents:.	
(a) The plan must be written in English.	
(b) Organization of the plan [13]	I.2.
(c) Required contents.	
(d) Sections submitted to COTP.	
(e) Cross-references	III.8.
(f) Consistency with NCP and ACPs	III.3.d.(3).
154.1035 Significant and substantial harm facilities:	
(a) Introduction and plan content	III.1.
(1) Facility's name, physical and mailing address, county, telephone, and fax	I.4.a; I.4.c–d; I.4.h–i
(2) Description of a facility's location in a manner that could aid in locating the facility	I.4.c.
(3) Name, address, and procedures for contacting the owner/operator on 24-hour basis.	I.4.b; II.2.a
(4) Table of contents	I.2.
(5) Cross index, if appropriate	III.8.
(6) Record of change(s) to record information on plan updates	I.3; III.6.
(b) Emergency Response Action Plan:	
(1) Notification procedures:	
(i) Prioritized list identifying person(s), including name, telephone number, and role in plan, to be notified in event of threat or actual discharge.	II.2.a; III.2.a–c.
(ii) Information to be provided in initial and follow-up notifications to federal, state, and local agencies.	III.3.b; III.2.a–c.
(2) Facility's spill mitigation procedures [14]	II.2.d.(2); III.3.c.(2).
(i) Volume(s) of persistent and non-persistent oil groups.	
(ii) Prioritized procedures/task delegation to mitigate or prevent a potential or actual discharge or emergencies involving certain equipment/scenarios.	II.2.
(iii) List of equipment and responsibilities of facility personnel to mitigate an average most probable discharge.	II.2.e–f; III.3.f.(3); III.3.c.(1)–(5).
(3) Facility response activities [15]	II.2.c; II.2.e–f; II.3; II.4; III.3.c.(3).
(i) Description of facility personnel's responsibilities to initiate/supervise response until arrival of qualified individual.	II.1; II.2.
(ii) Qualified individual's responsibilities/authority	II.2.
(iii) Facility or corporate organizational structure used to manage response actions	II.2.b; II.3; III.3.a; III.3.b.(2)–(4); III.3.c; III.3.d.(1); III.3.e–f.
(iv) Oil spill response organization(s)/spill management team available by contract or other approved means.	II.2.d.(3); III.3.c.(4)–(5); III.3.e.(6); III.3.f.(1)–(2); III.3.f.(5).
(v) For mobile facilities that operate in more than one COTP, the oil spill response organization(s)/spill management team in the applicable geographic-specific appendix.	II.2.d.(3).
(4) Fish and wildlife sensitive environments	III.1.c; III.3.d.(1)–(2).
(i) Areas of economic importance and environmental sensitivity as identified in the ACP that are potentially impacted by a WCD.	II.2.c.
(ii) List areas and provide maps/charts and describe response actions.	
(iii) Equipment and personnel necessary to protect identified areas	II.2.e–f; III.3.f.(3); III.3.c.(1)–(5).
(5) Disposal plan	III.3.d.(4).
(c) Training and exercises	III.5.
(d) Plan review and update procedures	III.6.
(e) Appendices	I.4.c; III.1.b.
(1) Facility specific information	III.1.
(2) List of contacts	II.2.a; III.2.a–c; III.3.b.(1).
(3) Equipment lists and records	III.3.e.(3); III.3.e.(6); III.3.f.(1); III.3.f.(3)–(5).
(4) Communications plan	III.3.b.(2).
(5) Site-specific safety and health plan	III.3.b.(3); III.3.c.(7); III.3.e. (1).

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(6) List of acronyms and definitions.	
(7) A geographic-specific appendix.	
154.1040 Specific requirements for substantial harm facilities.	
154.1041 Specific response information to be maintained on mobile MTR facilities.	
154.1045 Groups I–IV petroleum oils.	
154.1047 Group V petroleum oils.	
154.1050 Training	III.5.
154.1055 Drills	III.5.
154.1057 Inspection and maintenance of response resources	III.3.e.(6).
154.1060 Submission and approval procedures.	
154.1065 Plan revision and amendment procedures	III.6.
154.1070 Deficiencies.	
154.1075 Appeal Process.	
Appendix C—Guidelines for determining and evaluating required response resources for facility response plans.	III.3.f.(3).
Appendix D—Training elements for oil spill response plans	III.5.
DOT/RSPA FRP (49 CFR Part 194)	
194.101 Operators required to submit plans.	
194.103 Significant and substantial harm: operator's statement	III.8.
194.105 Worst case discharge	III.3.d.(1).
194.107 General response plan requirements:	
(a) Resource planning requirements	III.3.d.
(b) Language requirements.	
(c) Consistency with NCP and ACP(s)	III.3.d.(3); III.8.
(d) Each response plan must include:	
(1) Core Plan Contents:	
(i) An information summary as required in 194.113	I.4; III.1.
194.113(a) Core plan information summary:	
(1) Name and address of operator	I.4.b; I.4.d.
(2) Description of each response zone	I.4.c.
(b) Response zone appendix information summary:	
(1) Core plan information summary	I.4; III.1.
(2) Name^O^S^A^A^O Submission and approval procedures	III.6.
194.121 Response plan review and update procedures	III.6.
^Apendix^S^A^Aecommended guidelines for the preparation of response plans	I.2.
Section 1—Information summary	I.4.b–c; II.2.a; II.2.f; III.8.
Section 2—Notification procedures	II.2.a; III.2; III.3.b.(2); III.3.e.(3).
Section 3—Spill detection and on-scene spill mitigation procedures	II.1; II.2.e–f; III.3.c.(2).
Section 4—Response activities	II.2.b; III.3.b.(1).
Section 5—List of contacts	II.2.a.
Section 6—Training procedures	III.5.
Section 7—Drill procedures	III.5.
Section 8—Response plan review and update procedures	III.6.
Section 9—Response zone appendices	II.2.b; II.3; III.1.a–c; III.3.
OSHA Emergency Action Plans (29 CFR 1910.38(a)) and Process Safety (29 CFR 1910.119)	
1910.38(a) Emergency action plan:	
(1) Scope and applicability	III.3.c.(1); III.3.d.
(2) Elements:	
(i) Emergency escape procedures and emergency escape route assignments	II.2; II.2.c; III.3.b.(3); III.3.c.
(ii) Procedures to be followed by employees who remain to operate critical plant operations before they evacuate.	II.2; II.2.c; II.2.e; III.3.c.
(iii) Procedures to account for all employees after emergency evacuation has been completed.	II.2.a; III.3.b.(2); III.3.b.(3); III.3.c; III.4.
(iv) Rescue and medical duties for those employees who are to perform them	III.3.b.(3); III.3.c; III.3.c.(7); III.3.e.(1).
(v) The preferred means of reporting fires and other emergencies	II.2.a; III.3.b.
(vi) Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan.	I.4.f; II.2.a; III.3.b.(2); III.3.b.(4).
(3) Alarm system[16]	II.2.a; III.3.c.(3); III.3.e.(3).
(4) Evacuation	II.2.d; III.3.b.(3); III.3.c.(3); III.3.d; III.3.d.(1).
(5) Training	III.3.e.(5); III.5.
1910.119 Process safety management of highly hazardous chemicals:	
(e)(3)(ii) Investigation of previous incidents	III.4; III.4.b.
(e)(3)(iii) Process hazard analysis requirements	III.3.e.(3).
(g)(1)(i) Employee training in process/operating procedures	III.5.
(j)(4) Inspection/testing of process equipment	III.3.e.(6).
(j)(5) Equipment repair	III.3.e.(6).
(l) Management of change(s)	III.5.
(m) Incident investigation	III.4.a.

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(n) Emergency planning and response	I.1; II.1; II.2; II.2.d; III.2; III.2.a; III.2.b.
(o)(1) Certification of compliance	III.6.
1910.165 Employee alarm systems:	
(b) General requirements	III.3.e.(3).
(b)(1) Purpose of alarm system	III.2; III.2.a.
(b)(4) Preferred means of reporting emergencies	III.2.
(d) Maintenance and testing	III.3.e.(6).
1910.272 Grain handling facilities:	
(d) Development/implementation of emergency action plan	I.1; III.2.
OSHA HAZWOPER (29 CFR 1910.120)	
1910.120(k) Decontamination	III.3.c.(6).
1910.120(l) Emergency response program	I.1.
(1) Emergency response plan:	
(i) An emergency response plan shall be developed and implemented by all employers within the scope of this section to handle anticipated emergencies prior to the commencement of hazardous waste operations.	
(ii) Employers who will evacuate their employees from the workplace when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan complying with section 1910.38(a) of this part.	
(2) Elements of an emergency response plan:	
(i) Pre-emergency planning and coordination with outside parties	I.4.f; II.2.b; II.2.c; III.2.b; III.2.c; III.3.b.(4); III.3.d.
(ii) Personnel roles, lines of authority, and communication	I.4.f; II.2.b; III.2.a; III.2.c; III.3.b.(4); III.3.e.(4).
(iii) Emergency recognition and prevention	II.1; III.7.
(iv) Safe distances and places of refuge	III.3.b.(3); III.3.d.(2).
(v) Site security and control	III.3.d.(2); III.3.e.(2).
(vi) Evacuation routes and procedures	II.2.d; III.3.b.(3)
(vii) Decontamination procedures	III.3.c.(6).
(viii) Emergency medical treatment and response procedures	II.2.d; III.3.c.(7); III.3.e.(1).
(ix) Emergency alerting and response procedures	II.2; II.2.a; II.2.f; II.4; III.2; III.2.a; III.2.b; III.2.c; III.3.d.
(x) Critique of response and follow-up	II.3; III.4; III.4.a; III.6.
(xi) PPE and emergency equipment	III.3.e.(6); III.3.f.(3); III.3.d.(2); III.3.e.(6); III.3.f.(3).
(3) Procedures for handling emergency incidents:	
(i) Additional elements of emergency response plans:	
(A) Site topography, layout, and prevailing weather conditions	III.1.c.
(B) Procedures for reporting incidents to local, state, and federal government agencies.	II.2.a; III.2.
(ii) The emergency response plan shall be a separate section of the Site Safety and Health Plan.	
(iii) The emergency response plan shall be compatible with the disaster, fire, and/or emergency response plans of local, state, and federal agencies.	III.3.e.
(iv) The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.	III.5.
(v) The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.	
(vi) An employee alarm system shall be installed in accordance with 29 CFR 1910.165 to notify employees of an emergency situation; to stop work activities if necessary; to lower background noise in order to speed communications; and to begin emergency procedures.	
(vii) Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan.	II.2.c; II.2.d.
1910.120(p)(8) Emergency response program:	I.1
(i) Emergency response plan.	
(ii) Elements of an emergency response plan:	
(A) Pre-emergency planning and coordination with outside parties	I.4.f; II.2.b; II.2.b; III.2.b; III.2.c; III.3.b.(4); III.3.d.
(B) Personnel roles, lines of authority, and communication	I.4.f; II.2.b; III.2.c; III.2.c; III.3.b.(4); III.3.e.(4).
(C) Emergency recognition and prevention	II.1; III.7
(D) Safe distances and places of refuge	III.3.b.(3); III.3.d.(2)
(E) Site security and control	III.3.d.(2); III.3.e.(2)
(F) Evacuation routes and procedures	II.2.d; III.3.b.(3).
(G) Decontamination procedures	III.3.c.(6).
(H) Emergency medical treatment and response procedures	II.2.d; III.3.c.(7); III.3.e.(1).
(I) Emergency alerting and response procedures	II.2; II.2.a; II.2.f; II.4; III.2; III.2.a; III.2.b; III.2.c; III.3.d.

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(J) Critique of response and follow-up	II.3; III.4; III.4.a; III.6.
(K) PPE and emergency equipment	III.3.e.(6); III.3.f.(3); III.3.d.(2); III.3.e.(6); III.3.f.(3).
(iii) Training	III.5.
(iv) Procedures for handling emergency incidents:	
(A) Additional elements of emergency response plans:	
(1) Site topography, layout, and prevailing weather conditions	III.1.c; III.3.d.(1).
(2) Procedures for reporting incidents to local, state, and federal government agencies.	II.2.a; III.2.
(B) The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.	III.3.e.
(C) The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.	
(D) The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.	
(E) An employee alarm system shall be installed in accordance with 29 CFR 1910.165.	
(F) Based upon the information available at the time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan	II.2.d; II.2.e; III.3.d.(1).
1910.120(q) Emergency response to hazardous substance releases:	
(1) Emergency response plan	III.3.1.
(2) Elements of an emergency response plan:	
(i) Pre-emergency planning and coordination with outside parties	I.4.f; II.2.b; II.2.c; III.2.b; III.2.c; III.3.b.(4); III.3.d.
(ii) Personnel roles, lines of authority, training, and communication	I.4.f; II.2.b; III.2.b; III.2.c; III.3.b.(4); III.3.e.(4).
(iii) Emergency recognition and prevention	II.1; III.7.
(iv) Safe distances and places of refuge	III.3.b.(3); III.3.d.(2).
(v) Site security and control	III.3.d.(2); III.3.e.(2).
(vi) Evacuation routes and procedures	II.2.d; III.3.b.(3).
(vii) Decontamination procedures	III.3.c.(6).
(viii) Emergency medical treatment and response procedures	II.2.d; III.3.c.(7); III.3.e.(1).
(ix) Emergency alerting and response procedures	II.2; II.2.a; II.2.f; II.4; III.2; III.2.a; III.2.b; III.2.c; III.3.d.
(x) Critique of response and follow-up	II.3; III.4; III.4.a; III.6.
(xi) PPE and emergency equipment	III.3.e.(6); III.3.f.(3); III.3.d.(2); III.3.e.(6); III.3.f.(3).
(xii) Emergency response plan coordination and integration	III.3.e; III.8.
(3) Procedures for handling emergency response:	
(i) The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS).	II.2.b; III.3; III.3.a; III.3.b; III.3.b.(1); III.3.b.(2); III.3.e.(3).
(ii) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.	II.2.c; II.2.d; III.3.c.(3).
(iii) Implementation of appropriate emergency operations and use of PPE	II.2.c; II.2.d; II.2.e; III.3.c; III.3.c.(1); III.3.d.(1); III.3.d.(2).
(iv) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in emergency response.	II.2.d.
(v) The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to incident or site hazards, to those who are actively performing emergency operations.	III.3.c; III.3.e.(5).
(vi) Backup personnel shall stand by with equipment ready to provide assistance or rescue.	II.2.d; III.3.e.(5).
(vii) The individual in charge of the ICS shall designate a safety official, who is knowledgeable in the operations being implemented at the emergency response site.	II.2.d; III.3.b.(3).
(viii) When activities are judged by the safety official to be an IDLH condition and/or to involve an imminent danger condition, the safety official shall have authority to alter, suspend, or terminate those activities.	III.3.b.(3).
(ix) After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.	III.3.c.(6).

ATTACHMENT 3: REGULATORY CROSS-COMPARISON MATRICES—Continued

	ICP Citation(s)
(x) When deemed necessary for meeting the tasks at hand, approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating.	
(4) Skilled support personnel.	
(5) Specialist employees.	
(6) Training	III.5.
(7) Trainers.	
(8) Refresher training.	
(9) Medical surveillance and consultation.	
(10) Chemical protective clothing.	
(11) Post-emergency response operations.	
EPA's Risk Management Program (40 CFR Part 68)	
68.20–36 Offsite consequence analysis	III.3.d.(1).
68.42 Five-year accident history	III.4.b.
68.50 Hazard review	III.3.d.(1).
68.60 Incident investigation	III.4.a
68.67 Process hazards analysis	III.3.d.(1)
68.81 Incident investigation	III.4.a
68.95(a) Elements of an emergency response program:	
(1) Elements of an emergency response plan:	
(i) Procedures for informing the public and emergency response agencies about accidental releases.	II.2.a; III.2.
(ii) Documentation of proper first-aid and emergency medical treatment necessary to treat accidental human exposures.	III.3.c.(7); III.3.e.(1).
(iii) Procedures and measures for emergency response after an accidental release of a regulated substance.	II.1; II.2; II.3; II.4; III.3.a–c.
(2) Procedures for the use of emergency response equipment and for its inspection, testing, and maintenance.	III.3.e.(6).
(3) Training for all employees in relevant procedures	III.5.
(4) Procedures to review and update the emergency response plan	III.6.
68.95(b) Compliance with other federal contingency plan regulations.	
68.95(c) Coordination with the community emergency response plan.	

Notes to Attachment 3

[1] Facilities should be aware that most states have been authorized by EPA to implement RCRA contingency planning requirements in place of the federal requirements listed. Thus, in many cases state requirements may not track this matrix. Facilities must coordinate with their respective states to ensure an ICP complies with state RCRA requirements.

[2] Facilities should be aware that most states have been authorized by EPA to implement RCRA contingency planning requirements in place of the federal requirements listed. Thus, in many cases state requirements may not track this matrix. Facilities must coordinate with their respective states to ensure an ICP complies with state RCRA requirements.

[3] Facilities should be aware that most states have been authorized by EPA to implement RCRA contingency planning requirements in place of the federal requirements listed. Thus, in many cases state requirements may not track this matrix. Facilities must coordinate with their respective states to ensure an ICP complies with state RCRA requirements.

[4] Section 264.56 is incorporated by reference at § 264.52(a).

[5] Incorporates by reference § 264.37.

[6] Section 265.56 is incorporated by reference at § 265.52(a).

[7] Incorporates by reference § 265.37.

[8] Section 279.52(b)(6) is incorporated by reference at § 279.52(b)(2)(i).

[9] Incorporates by reference § 279.52(a)(6).

[10] Non-response planning parts of this regulation (e.g., prevention provisions) require a specified format.

[11] If a facility is required to develop a strong oil spill contingency plan under this section, the requirement can be met through the ICP.

[12] The appendix further describes the required elements in 120.20(h). It contains regulatory requirements as well as recommendations.

[13] Specific plan requirements for sections listed under 154.1030(b) are contained in 154.1035(a)–(g).

[14] Note: Sections 154.1045 and 154.1047 contain requirements specific to facilities that handle, store, or transport Group I–IV oils and Group V oils, respectively.

[15] Ibid.

[16] Section 1910.38(a)(3) incorporates 29 CFR 1910.165 by reference.

Dated: April 18, 1996.

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Dated: April 22, 1996.

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Last Updated: April 8, 1998

Guidelines for Hazardous Materials TRAINING PROGRAM MANAGEMENT

About the Training Program Management Guidelines

The Training Program Management Guidelines are provided to assist public sector training managers and employers in performing several key tasks in the management of hazardous materials trainining programs. Guidance is provided for the following tasks:

1. Training Needs Assessment: Guidance is provided on developing, maintaining and reporting information regarding levels of responder/planner competencies and on defining and reporting type and volume of training needed within the manager's jurisdiction. Existing regulatory requirements are defined and procedural recommendations are provided. Directions are provided for using a standardized data form for data compilation and reporting.

2. Assessment of Response Courses: Guidance is provided on using the Response Guidelines to assess courses for compliance with OSHA 29 CFR 1910.120 and EPA 311, and compatibility with NFPA 472 and other recommended standards. Guidance is also provided on using the Response Guidelines for standardized description of the substance, scope and utility of courses, to facilitate information sharing and materials exchange with peer training program managers in other jurisdictions. Directions are provided for using standardized course objectives assessment worksheets and a standardized course description and assessment reporting format.

3. Assessment of Planning Courses:
Guidance is provided on using the Planning Guidelines to assess courses for fit with the training competencies identified for the different roles and functions involved in hazardous materials planning. Guidance is also be provided on using the Planning Guidelines for standardized description of the substance, scope and utility of courses, to facilitate information sharing and materials exchange with peer training program managers in other jurisdictions. Directions are provided for using standardized course objectives assessment worksheets and a standardized course description and assessment reporting format.

Hazardous Materials

TRAINING NEEDS ASSESSMENT

The purpose of a hazardous materials training program is to ensure, through training, that persons performing assigned response, planning and prevention responsibilities have the knowledge, skills and abilities to discharge their responsibilities safely and effectively. Other aspects of these guidelines provide support in evaluating existing training materials against established performance standards and in managing the delivery of hazardous materials training. However, providers of training also need to identify the numbers and types of individuals that need to be trained within their juridiction. This information is essential in order determine the scope of the overall training program needed to ensure that all personnel within the jurisdiction will be properly trained to meet the standards and/or achieve a given level of capability. This is the objective of a jurisdictional training needs assessment.

This section explores the rationale for conducting jurisdictional training needs assessments, discusses some of the methodology options and issues associated with jurisdiction-wide needs determination, and provides directions for using a standardized needs assessment worksheet for collecting, organizing and reporting needs assessment data.

What is it?

A training needs assessment is any method of determining what training is needed. It can range from an in-depth analysis of a single specific job task in support of development of a single portion of a training program, to a broad analysis of all hazards faced by an entire jurisdiction in order to determine the tasks and functions that all responders and planners need to be trained to perform. It can range in expense and effort from an "educated guess" of training need made by a group of experts in a single meeting to a jurisdiction-wide survey and statisitical analysis that involves great expense and effort by many people over a period of many months or even years.

For any jurisdiction, the primary purpose of a hazardous materials training needs assessment is to determine how many persons there are within the jurisdiction who are involved in hazardous materials planning, prevention and response and which of those persons need which types and levels of training. The process for determining this information can vary greatly in terms of the amount of effort expended and the breadth of issues considered. Regardless of the approach taken and the complexity of the needs assessment that is produced, a "bottom line" for any jurisdiction-level needs assessment effort is the final data on the training need for that jurisdiction. This "bottom line" should consist of clearly stated data on the numerical size of the training audience and the numbers of employees and other personnel which will need complete or refresher training at each of the different response levels and for all appropriate levels in planning and prevention. This data is essential for jurisdiction-wide training plan development, prioritization of programs, and the strategic allocation of training resources.

Why do it?

A jurisdiction-level training needs assessment is often viewed as a "nice to do" activity and is usually deferred as a lower priority in the face of limited resources for hazardous materials training. However, there are several compelling reasons why such a training needs assessment should be given a high priority in jurisidictions who do not have the needs assessment data presently.

COMPLIANCE WITH FEDERAL REGULATIONS

Under OSHA 29 CFR 1910.120 and EPA 311, the employer must ensure that all responders are trained to minimum competency before responding. State, tribal, territorial and local governments are employers of public sector responders. Data on how many there are, who is trained and who isn't is essential to be able to document that State and local governments are in compliance.

EFFICIENT USE OF RESOURCES

This data is vital for good training plan development. State, tribal, territorial and local training offices must know the scope and nature of the overall training requirement and the specific areas in which current training levels are deficient, in order to determine resources needed and to prioritize training properly to achieve compliance through training with OSHA/EPA requirements.

STRATEGIC PLANNING
Clear data documention of the overall training need within the jurisdiction can be used as the foundation for measurement of progress toward established goals. The data makes possible multi-year training plans and budgets that focus on the impact and comprehensiveness of training. For financial planning and budget purposes, the data is fundamental to justify appropriations and support applications for critically needed supplemental funding and support.

Methodology Considerations

There are two basic approaches usually used to conduct a jurisdiction-level needs assessment, although there are numerous variations possible depending upon differences in State, tribal, territorial and local organizational responsibilities, resources and preferences. The two basic approaches are (1) estimating the need at the State, tribal, or territorial level, and (2) determining the need at the local level and aggregating it at the State, tribal or territorial level.

ESTIMATING NEED AT THE STATE, TRIBAL OR TERRITORIAL LEVEL
This is the least accurate method, but is often used when resources or time prohibit the survey approach discussed below. The challenge is to attempt an unbiased and well-informed estimate. It is recommended that an expert team be formed including good representation of the different jurisidictions within the State, tribe or territory, and representation of the primary disciplines or professions involved in planning and response. All relevant existing data, such as demographic infomation, known turnover percentages, and existing needs estimates should be compiled and provided to the team. The final needs assessment estimate of the team should be a concensus product reflecting the best opinion of all team members. If possible, the resulting estimate should be reviewed by as many local jurisdictions as resources permit.

SURVEYING: USING THE “BOTTOMS UP APPROACH”
This is the most accurate approach to State, tribal or territory needs assessment and has many ancillary benefits beyond accurate data such as hightened local understanding of local training needs. The general process is to develop a needs survey instrument and distribute it to local jurisdictions for development of the information. It is important to have local jurisdiction input into the development of the survey instrument, and to allow sufficient time and resources for local jurisdictions to conduct the needs assessment. The instrument should include directions and a reporting form, and the model form provided in this guidance is offered for optional use. It is recommended that local personnel receive an orientation to the needs assessment work as well as the instrument itself, and that attention be given to consistency to avoid skewed information. It is recommended that attempts be made to establish a “network” with these persons for subsequent updates to maintain the currency and accuracy of the final information. Logistical problems should be anticipated and budgeted for, such as the time needed by State, tribal or territory personnel to follow-up to ensure that all participants complete the work

USING A MIXED APPROACH
Often, it is necessary to use both approaches to determine complete State, tribal and territorial needs assessment data, because local resources and data management systems can vary such that incomplete data will be received from the survey method. In that case, it is recommended that (1) data be collected from major metropolitan areas and local jurisidictions with well-staffed training resources, (2) a sampling be conducted of smaller jurisdictions to determine average data for those groups, and (3) an expert team be assembled at the State, tribe or territory level to extrapolate and “fill in the holes” to reach a final estimate of the need within the jurisdiction.

Issues

DEFINING PLANNING AND PREVENTION TRAINING LEVELS
Defining Planning and Prevention training needs is usually more difficult than defining Response needs, because the roles and responsibilities of public sector employees in these areas are usually not as well defined. It is recommended that survey instruments or expert team work include a draft definition of these

roles for each jurisdiction on which to base an estimate of the training needed to support competency in these roles.This is very important to avoid gaps in training that may result in persons being asked to perform planning and prevention functions (such as preparing local response plans) for which they are not trained or fully competent and upon which the safety of responding personnel may depend. Attention should also be given to the difficulties in determining planning audiences and roles when the planning and SOP work is done as a secondary or occasional duty and the need for training is not immediately evident.

For hazardous materials planning, it is recommended that individual personnel roles be identified at the needs assessment stage in terms of the orientation, essentials, and speciality competencies used in the Planning Guidelines. This will simplify subsequent identification of training need.

VOLUNTEER RESPONDERS

Hard data on number of volunteer responders in the jurisdiction and their existing level of training may be very difficult to acquire because many volunteers may be part time or infrequent participants in response, and volunteer department rosters may include many inactive members. However, State, tribal, territory and local governments are the "employer" of volunteers when they are participating in the response, and therefore are responsible for ensuring competency. Every effort should be made to not underestimate the training need for volunteer responders.

BALANCING RESPONSE PLANS WITH RESPONSE TRAINING NEEDS

Care should be taken to ensure that response training needs describe levels of competency that match actual response plans. For example, the number of persons that are needed to be competent as members of hazardous materials teams should reflect the number and organizational location of hazardous materials response teams in the local and State, tribal and territory emergency response plans. If there is a question about the soundness of the resource requirements described in the plans, some jurisdictions may find the need to undertake a more significant needs assessment for hazardous materials that would include revisiting hazards analyis and/or revisiting response capabilitiy needs. If emergency plans themselves are in question, this may also entail revisiting organizational responsibilities for plan development and jurisdictional models for plan structure and soundness. These issues involve a much more complex effort than is addressed in this guidance, but may have to be considered if it is found that problems in these areas prevent State, tribal, territory and local definition or confirmation of the training need.

Training Needs Information- The Bottom Line Numbers

Regardless of the process used to develop needs assessment data and regardless of the depth or complexity of the information addressed, there are severall basic and simple questions that must be answered if the needs assessment is to support training plan development. In order to determine training resource requirements, training strategies, and compliance with OSHA and EPA requirements, the absolute minimum information that must be determined is the number of people who are not trained or able to perform the function they will be called upon to perform. The basic questions that provide this information are:

(1) How many need to be able to perform each function (such as Incident Commander),
(2) How many are able to perform this function at present, and
(3) How many have not yet been trained or are not yet able to perform this function.

Example

10 firefighters needed to function as incident commander at haz mat emergencies.

4 have already received training or are certified competent at the incident commander level of the guidelines.

6 need to be trained to the incident commander level.

For large jurisdictions such as State training offices with training responsibilities for all response and planning functions, four sets of "bottom line" information are needed:

1. The potential training population. This is the number of persons in the jurisdiction who will potentially be involved in hazardous materials response, planning and prevention work. This information is usually divided by discipline, such as number of fire service potential responders, number of law enforcement potential responders, etc. Anticipated annual turn-over rates are usually included, so the number in the potential training population is usually somewhat larger than the actual number of persons currently employed.

2. How many are needed to be competent at a particular level. This is the number of persons in the jurisdiction that need to be competent to perform each role called for in response, planning, and prevention. For example, one portion of this data would be the number of firefighters needed to be competent at the Technician level. This number is determined by the response plans and response rotocols of the individual jurisdiction, and will vary greatly across jurisdictions. For example, one jurisdiction may use regional hazardous materials response teams and need a smaller number of technican-level responders than a comparably sized jurisdiction with a greater frequency of calls that must maintain local hazardous materials response teams and therefor a greater number of trained technicians.

3. How many have already been trained or certified as competent. This is the number of persons in the jurisdiction that need to be competent and either have already been trained or have been certified as competent by the employer. Records should exist to confirm that the training was received to maintain compliance with OSHA and EPA requirements. If the responder is certified as competent in lieu of training, this must be done by the immediate employer (for example, the Fire Chief or designee on behalf of the local municipal government). Note that OSHA and EPA requirements for annual refresher training apply to all persons already trained or certified as competent. Therefore, this number also becomes the number of persons needing annual refresher training or recertification.

4. How many will need complete training. This is the number of persons in the jurisdiction that need to be competent but are not so at the present time and need to be fully trained.

Example

	Firefighter	Law Enf.	
How many total potential responders (all functions)?	*2,800*	*1,400*	
Anticipated annual turnover?	*280*	*140*	
Total Potential Training Population	*3,080*	*1,540*	
Incident Commander Level			**Total**
How many are needed to be competent at this level?	*190*	*50*	
How many have already been trained or certified as competent?	*35*	*10*	*45*
How many will needed complete training?	*155*	*40*	*195*

Training Need

195 Incident Commander Full Training
45 Incident Commander Refresher Training

Reporting the Training Need

On the following pages are model needs assessment reporting forms. These forms focus on quantifiable summaries of training need- the bottom line numbers- as discussed above. These should be used to report training need with the HMEP grant applications and it is recommended that they also be used as a data gathering form for local submissions to the State, tribal or territory level during the needs assessment process.

The response form follows the above models and uses the standard function definitions of OSHA and NFPA, specifically as elaborated upon in the Response Guidelines portion of this document. Using the above samples, data entry into this form should be self-explanatory.

The planning form follows the above models and uses the function/competency definitions (orientation, essentials, and specialities) presented in the planning guidelines. Translation of existing demographic information (such as the number of LEPC members within a State) into the numbers of persons to be trained to a given competency requires judgement and decision-making regarding the sophisitication of planning roles to be performed. This will vary from jurisdiction to jurisdiction, depending upon the organization of planning responsibilities. For example, one State might prefer that all commodity flow studies in the State be done by State staff, so all local planning team members might require essentials-level training but only selected state personnel would need speciality-level training in doing a commodity flow study. See the planning curriculum guidelines for more thorough background information on defining these roles and responsibilities.

RESPONSE Training Needs Worksheet

		Fire	Law	EMS	Other	TOTAL Full Training Refresh
	How many responders presently?					
	Anticipated annual turnover?					
	Total Potential Training Population					
1st Resp. Awareness	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
1st Resp. Operations	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Haz Mat Technician	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Incident Commander	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
HM Branch Officer	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Safety Officer	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Haz Mat Specialist	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Specialist Employee	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
EMS Level 1	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
EMS Level 2	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Hospital ER Empl.	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					

PLANNING Training Needs Worksheet

		Local Planning Team Members	State/ Tribal/Terr. Planning Personnel	OTHER Public Sector	OTHER Private Sector	TOTAL ■ Full Training ■ Refresh
	How many presently?					
	Anticipated annual turnover?					
	Total Potential Training Population					
Planning Orientation	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Essentials	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Commodity Flow Study**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Hazard Analysis**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Capability Assessment**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Protective Actions**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Plan Implementation & Maintenance**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Facility Planning**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Public Education**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					

Hazardous Materials
Response Course Assessment

Response Course Assessment DIRECTIONS

These instructions describe the methodology for assessing hazardous materials response courses. Section 1, **General Information**, explains the purpose and nature of the assessment process. Section 2, **Performing a Course Assessment**, identifies basic steps for completing the assessment instruments. Section 3, **Specific Instructions**, provides block-by-block directions for filling out the instruments. A completed sample is attached, showing the assessment of the National Fire Academy course *Initial Response to Hazardous Materials Incidents: Basic Concepts*.

Every effort has been made to keep these instruments and instructions as simple and useful as possible. However, assessing adult training activities inherently involves some time and work.

1. GENERAL INFORMATION

Purpose of the Response Course Assessment Worksheet

The Response Course Assessment Worksheets are designed to (1) gather descriptive information about individual hazardous materials training activities in a standardized format, and (2) facilitate comparison of course content with the mandated and recommended training requirements identified in the Hazardous Materials Emergency Preparedness (HMEP) grant program document *Guidelines for Public Sector Hazardous Materials Training (Guidelines)*. The data can be used to:

- Evaluate the scope of existing courses relative to Federal and other national standards and guidelines.
- Disseminate information to state and local training managers nationwide about existing courses.
- Help training agencies assess the usefulness of existing courses for their own needs.

Why Assess Response Courses?

State and local agencies with hazardous materials training responsibilities can use the results of the assessment process for the purpose of:

1. Certifying compliance of training with OSHA 29 CFR 1910.120 and EPA 311, and with the HMEP grant program curriculum Guidelines.
2. Verifying compatibility of training with NFPA 472, NFPA 473, and other training recommendations or requirements.
3. Analyzing and revising the current training plan.
4. Developing new courses or revising current ones to address unmet training needs.

5. Assessing whether to adopt or adapt an outside course for use within the organization or jurisdiction.

6. Communicating characteristics of existing courses to peer training managers in other organizations and jurisdictions.

7. Evaluating the capabilities of currently trained State and local response personnel.

8. Documenting and explaining the scope of training activities to outside decision-makers and the public.

The training needs of individual agencies or jurisdictions may differ from those defined here. Many factors that affect the quality of training are outside the scope of this assessment process. Training managers may supplement the results of this assessment process through peer instructor evaluation of deliveries, professional review of course materials, in-depth student and instructor interviews, student testing, and other forms of expert opinion.

Who Should Complete a Response Course Assessment?

A course assessment should be conducted by any organization with hazardous materials response training requirements.

All courses used in the HMEP grant program should be assessed. This includes Federal, State, tribal, and Protectorate, national professional association, and private sector courses used by grantees in their public sector training curriculums. Each course should be formally assessed by only one sponsoring organization.

HMEP grantees are responsible for assessing those courses in their curriculums (1) which they have developed entirely or modified for their specific use and (2) which are provided by private sector sources and contractors (other than national associations) and are used by the HMEP grantees use as part of their public sector curriculum. HMEP grantees are not responsible for assessing Federal, national association courses, or courses from other HMEP grantee curriculums. Federal and national association providers of training will be asked to provide assessment of their respective programs which are in use by HMTA grantees.

Assessment Evaluator Qualifications

It is recommended that assessment evaluators have the following minimum qualifications:

- A thorough understanding of the course purpose, training objectives, content, and instructional methodologies.

- Be familiar with the course delivery requirements, related administrative considerations, and student evaluation results.

- Have in-depth knowledge of all target training audiences, including their response roles, job tasks, and required competencies.

- Have knowledge of hazardous materials response operations, applicable regulations and standards, including those promulgated by OSHA, EPA, and NFPA.

- Have experience and credentials in applying the principles and techniques of adult education to emergency services audiences.

Given the nature of the assessment process, sponsoring organizations may wish to consider using a workgroup approach, particularly for major courses. Assessment evaluators may include members of the course design and development team; experienced instructors, training program administrators, and course managers; qualified members of the training audience; and other hazardous materials experts as deemed appropriate.

2. PERFORMING A RESPONSE COURSE ASSESSMENT

Initial Considerations

Before filling out the assessment instruments, participants should understand the purpose and requirements of the assessment process, and be familiar with the HMEP *Guidelines*.

The first step is to determine the desired depth of the analysis. Generally, one set of assessment instruments is completed for each course. If a course is comprised of major modules or sections that could serve as stand-alone courses in themselves it may be desirable to complete a separate set of instruments for each of those modules or sections of the course.

To decide the appropriate level of assessment consider the possible ways other emergency services organizations may use the training, the information, and decision-making needs of peer training managers. If, in your judgement, a significant number of agencies would benefit by more detailed information, complete one set of instruments for each major module or section of the course. Otherwise, fill out one set of instruments for the entire course.

General Steps in the Process

You are now ready to begin the course assessment. Following the general steps listed below will help you prepare the forms quickly and accurately.

Step 1: Review Course Training Materials — Gather and review all course instructional materials. These may include plans of instruction, content outlines, student manuals, instructor guides, audiovisual presentations (films, videotapes, slide-tapes, etc.), job aids, reference materials, and handout materials.

Step 2: Review Course Delivery Data — Gather and review materials that describe the effectiveness of previous course deliveries. These may include data on course offerings and participants, student and instructor training evaluations, student test summaries, and long-term performance evaluation results. You may interview or survey persons knowledgeable about course deliveries.

Step 3: Gather Related Documents — Obtain copies of other documents that may be useful in the course assessment process. Examples might include related federal legislation and regulations, copies of NFPA 472 and 473, source materials used in the development of the course, refresher training and train-the-trainer materials, course promotional materials, technical documents referenced in the course.

Step 4: Select Appropriate Instruments — Each course assessment requires filling out two separate instruments:

- **Response Course Assessment Worksheet** describes the course and related delivery considerations. The basic format of the instrument is the same for all training activities assessed under this process. Copies of the instrument can be made from the master copy accompanying these instructions.

- **Response Course Objectives Worksheet(s)** assesses course content relative to the HMEP *Guidelines*, and identifies the required and recommended training objectives for all competency areas addressed in the course. Separate Course Objectives Worksheets are available for the following competency areas:

  First Responder Awareness
  First Responder Operations
  Hazardous Materials Technician
  Incident Commander
  Hazardous Materials Branch Chief (NFPA)
  Safety Officer at Hazardous Materials Incidents (OSHA)
  Hazardous Materials Branch Safety Officer (NFPA)
  Specilalist Employee (OSHA)
  Private Sector Specialist Employee C (NFPA)
  Private Sector Specialist Employee B (NFPA)
  Private Sector Specialist Employee A (NFPA)
  Hazardous Materials Specialist (OSHA)
  Technician with a Tank Car Speciality (NFPA)
  Technician with a Cargo Tank Speciality (NFPA)
  Technician with an Intermodal Tank Speciality (NFPA)
  Emergency Medical Service Level 1 Responder
  Emergency Medical Service Level 2 Responder
  Hospital Emergency Room Personnel

You should complete a separate Course Objectives Worksheet for each competency area addressed in the course. Make copies of the appropriate worksheets from the master copies accompanying these instructions. (More information is provided under Specific Instructions, Response Course Assessment Worksheet.)

Step 5: Fill in the Instruments — The block-by-block instructions for the instruments begin below. If more space is needed for your answers, use Section 12, Continuation, and attach separate sheets, as needed.

For most courses, the process can take approximately one to two hours per day of training depending on the complexity of the course, the number of people participating, their familiarity with the instructional materials, the desired workgroup process, the course's structural relationship to OSHA/EPA and NFPA standards, and other factors.

Step 6: Using the Completed Instruments — The completed instruments should be filed as documentation of your organization's finished HMTA self-assessment of response courses. They can also be used to review your curriculum for completeness and to support dialogue with other training systems regarding your programs. For submission of the information into the HMTA Course Assessment Project, please use the enclosed return envelope or equivalent and send copies of the completed Response Course Assessment Worksheet with Course Objectives Worksheets attached for each course assessed to:

William Lewis
HMTA Course Assessment Project
National Emergency Training Center, FEMA
16825 South Seton Avenue
Emmitsburg, MD 21727

If you have any questions or would like assistance in completing your course assessment, call William Lewis (301) 447-1009, or Jennifer Krietz (301) 447-1585, or FAX (301) 447-1588.

3. SPECIFIC INSTRUCTIONS

This section provides detailed instructions for filling out the Response Course Assessment Worksheet and the Course Objectives Worksheet. A completed sample of the instruments is attached. Please read these directions carefully as you proceed.

Response Course Assessment Worksheet

Block 1: Organization Sponsoring Course

Enter the name and address of the Sponsoring Organization (the agency that has primary responsibility for the design and content of the course, and which maintains associated rights) in Block 1. Include subdivision titles, as appropriate.

Block 2: Individual to Contact

Enter the name, mailing address, and phone number of a person assigned to serve as a contact for federal agencies, State and local training managers, and others interested in learning more about the course. This person should be knowledgeable about the course and able to answer questions about the assessment process and results.

Block 3: General Course Description

A. Course Title — Enter the complete formal title of the course, including subtitles.

B. Edition Number and/or Date — Enter the official course number or edition/revision number and date which is used to identify the course. This number typically appears on the cover or title page of the instructional materials.

The identifying number should refer to the entire course, not separate elements such as the student manual, instructor guide, or videotapes. Do not list the International Standard Book Number (ISBN), Library of Congress Catalog Card Number, or other publishing reference number. For published works, enter the most recent publication date, but not the date of later reprintings (if any).

C. Length (hours) — Enter the length or duration of classroom hours per course. Course length includes all educational activities that are part of the course.

D. Course Purpose or Goal — The course purpose or goal is a brief statement (one to three sentences) that broadly defines the desired outcome(s) of the total educational experience, and attempts to clarify the competencies or capabilities that students should possess after having satisfactorily completed all course requirements. This goal is met when all training objectives identified for the course have been achieved. As a rule of thumb, consider how best to complete the sentence “Having successfully completed the course, students will be able to....”

Block 4: Target Audiences, Competencies and Objectives

A. Target Audiences — For purposes of this assessment, target audiences are broadly defined as groups with similar organizational missions in hazardous materials incident response. These include the emergency services (fire, law enforcement, and emergency medical), public works, and other functional areas of State and local responsibility.

Identify the target audience categories for which this course is suitable by checking the appropriate boxes on the form. List other audiences that would benefit by this training. Examples might include elected/appointed officials, emergency management, public health, environmental agencies, and medical facilities.

B. Competencies and Objectives Addressed in Course — Competency areas are defined as response roles that public sector employees may be required to perform during a hazardous materials incident. The seven competency areas listed on the assessment form follow the categories identified in OSHA 1910.120, EPA 311 and the HMEP *Guidelines*.

An individual course may address parts of a competency area, a total competency area, or multiple competency areas. To determine which competency area(s) your course addresses, you must first compare the course content with the training objectives identified for each area. The objectives are listed in the HMEP *Guidelines* and are duplicated on the respective Course Objectives Worksheets.

After determining which competency areas your course addresses, check the appropriate boxes on the form. If the course addresses all the objectives in the competency area check "All"; if the course addresses only a portion of them check "Selected". You may need to check one or more competency areas. If you check "Selected" for any competency area, briefly explain the scope of the course in the space provided on the form. If more space is needed, continue in section 10: Special Course Characteristics. (Note: the description you provide should expand on and clarify the course purpose or goal statement entered in Block 3.)

Reminder: Fill out Course Objectives Worksheets for each competency area you check here, whether "All" or "Selected."

Block 5: Course Materials

A. Instructional Materials — Check the appropriate boxes to indicate which of the listed types of instructional materials are used in delivering the course. Enter the correct quantities for each type of material, as specified on the form. If separate refresher training materials are available, please describe them in Section 10: Special Course Characteristics. List other types of instructional materials used in the course (e.g., job aids, reference documents, films, computer software) in the space provided, continuing as necessary in Section 10: Special Course Characteristics.

B. Training Evaluation Materials — Check the appropriate boxes to indicate which of the listed types of evaluation materials are used in the course. If evaluation approaches other than student tests or instructor/student assessments are used, describe fully in Section 10: Special Course Characteristics.

C. Refresher Training Materials— Check the appropriate boxes to indicate whether refresher training guidance and/or materials are included in the course package. Describe focus, scope and competency priorities of any refresher training components in Section 10: Special Course Characteristics

D. Physical Skills Laboratory & Demonstration Equipment and Supplies — If special equipment or supplies are used in the delivery of the course, check the appropriate box(es) and explain briefly in Section 10: Special Course Characteristics. These materials include any props, tools, supplies, apparatus, equipment, or instructional aids that would not be readily available in a typical emergency services training environment. Do not include standard response equipment (turnout gear, firefighting tools, etc.) or common training supplies (media projectors, flipcharts, photocopying machines, etc.).

Block 6: Course Delivery Formats

Courses are designed for use in certain settings or environments, depending on the resources required for delivery, nature of the instruction, size and location of the target audience, cost considerations, and many other factors. Typical formats for emergency services training include:

- Independent student use — self-contained educational materials designed for use by individual target audience members without ongoing instructor support. (Note: this category includes computer-assisted instruction and interactive videodisc presentations).

- Local department/employer delivery — training that can be delivered by public sector organizations with the resources and capabilities commonly available at the local level.

- Field delivery run by centralized office — training delivered locally, but administered and perhaps staffed by a centralized facility, such as the Emergency Management Institute, State Fire Marshal's office, regional training academy, or private university.

- Special facility or fixed-site delivery — training that must be conducted on-site at a specific facility because it employs large, non-transportable equipment (such as large piping and valve systems, specialized simulation structures, etc.) or because other instructional considerations (such as co-locating with another program) restrict delivery of the course to the specific site.

- Broadcast or televised delivery — training designed for delivery to groups of students via teleconference, broadcast television, closed-circuit television, radio, or other similar instructional media.

Check the box for the delivery format that applies to the course. In most cases, only one delivery format should be marked. Sometimes, however, multiple delivery formats may be possible for the same course (e.g., local department/employer delivery or field delivery run by a centralized office). In other cases, different modules may be delivered using different instructional formats. If more than one delivery format applies, check the appropriate boxes and explain briefly.

Block 7: Unit or Module Summary

Use Block 7 to list the major modules, units, chapters, or sections of the course. Include the unit/module number, planned or expected duration in hours (see the instructions for Block 3), and title. If the sum of the hours shown here does not match the total for the course reported in Block 3, explain in Section 10, Special Course Characteristics.

For each unit/module, indicate whether it could serve in other curriculums as a stand-alone module. The purpose of this information is to assist other training managers in determining whether the material could be incorporated into their programs. In general, a unit has potential as a stand-alone training module if (1) there is closure within the unit of student learning including demonstration of mastery of the material, and (2) if the material is not dependent for coherency or learning upon the unique sequence of content in the preceding and following units of the course.

In addition, identify the types of instructional methodologies used in each unit/module by checking one or more of the boxes on the form. Check other methodologies (e.g., role play, interactive videodisc, behavior modeling, etc.) in the space provided.

Block 8: Materials From Other Programs Used in Course Development

Source materials are training programs, job task analyses, research reports, technical manuals, etc. that are used in developing the course. By identifying these source materials it will help peer training managers and others to:

- Understand the course based on familiarity with the source materials.
- Identify similarities and differences among training activities and programs.
- Evaluate appropriate applications of the course.

In this section of the form, you are asked to identify major source materials used in developing the course. Include only those materials that were used extensively or that contributed significantly to the final form and content of the course. Do not list others whose impact was less important, even if they were researched as part of the course design and development process. For each major source material, fill in the title and the

name of the organization that developed it. Then list the module/unit numbers (from Block 7) of the course that were strongly influenced by the source material. If the source material applies to the entire course, write "all." Explain as necessary in Section 12: Continuation.

Block 9: Factors Affecting Use of Course By Other Organizations

Many factors must be weighed when considering whether to adopt or adapt an existing course: associated costs, delivery requirements, compatibility with mission and audiences, ability to modify, available support services, ease of use. This section of the assessment form includes a checklist of these factors to help other training managers make decisions about using the course for their own needs.

Review the questions and check the appropriate box for each one that you answer affirmatively. Then, using this checklist as a "mind jogger," write in Section 11: Special Delivery Characteristics a brief summary of all major factors that could affect use of the course by other agencies. In your narrative, try to address typical decision-making needs and obstacles faced by training managers in emergency services organizations when developing, adapting, or conducting training. If more space is needed, use Section 12, Continuation.

Blocks 10-12

Use Blocks 10-12 to complete your response to other sections of the form (see the instructions for Blocks 4 through 9). Keep your responses as clear as possible.

Response Course Objectives Worksheets

The Response Course Objectives Worksheet is a tool to help you determine whether the course adequately addresses minimum training objectives set forth in the HMTA Guidelines. Required and recommended objectives are identified. The required objectives are based on OSHA/EPA regulations; recommended objectives were developed using NFPA 472 and 473 standards.

Worksheets exist for each of eighteen (18) competency areas. You should complete a separate worksheet for each competency area addressed in the course (see Block 4 of the Response Course Assessment Worksheet).. The competency areas are:

First Responder Awareness
First Responder Operations
Hazardous Materials Technician
Incident Commander
Hazardous Materials Branch Chief (NFPA)
Safety Officer at Hazardous Materials Incidents (OSHA)
Hazardous Materials Branch Safety Officer (NFPA)
Specilalist Employee (OSHA)
Private Sector Specialist Employee C (NFPA)
Private Sector Specialist Employee B (NFPA)
Private Sector Specialist Employee A (NFPA)
Hazardous Materials Specialist (OSHA)
Technician with a Tank Car Speciality (NFPA)
Technician with a Cargo Tank Speciality (NFPA)
Technician with an Intermodal Tank Speciality (NFPA)
Emergency Medical Service Level 1 Responder
Emergency Medical Service Level 2 Responder
Hospital Emergency Room Personnel

Enter the course title and name of the sponsoring organization on each form you fill out. The training objectives are listed in the left column. You may use either the required or the recommended objectives for your assessment. For each training objective, work horizontally across the page to make three determinations for each objective:

- The course time spent on the objective.
- The methods used to demonstrate student achievement of the objective.
- Whether the objective is adequately addressed in the course.

Course Time Spent On Objective

Estimating the amount of course time spent on each objective provides a useful indicator of the scope or depth of training in each area. More course time implies the opportunity for more in-depth instruction, and vice-versa. Estimating training time can be relatively straightforward for courses that are structured according to the OSHA/EPA or NFPA standards. In these situations, you need only analyze a typical course schedule or training agenda to determine how much time is allocated to each objective. Round the estimates to the nearest tenth (0.1) hour. If precise estimates are difficult, break the course down at least to half-hour (0.5) increments.

For courses that do not directly match the objectives or have a mix of origins, estimating training time will require more effort. You must review the course content using the following general procedures:

1. Think through the knowledge, skills, and attitudes (KSAs) needed by a typical student to achieve the training objective.
2. Identify all course content related to these KSAs. (Note: the content may be consolidated or spread out in different sections of the program).
3. Estimate the training time spent on this course content in a typical delivery.

As you conduct the analysis, you may find that some course content is related to more than one training objective. Other course content may not be associated with any of the objectives listed on the worksheet. Use your best judgement to include in your estimate all course time spent on content related to the objective whether or not this time is also reported for other objectives on the form. Relatively broad time estimates are acceptable.

Don't worry if the sum of the hours you estimate for the training objectives is different from the total you reported in Blocks 3 and 7. The figures will be adjusted later to reflect actual contact or classroom hours.

How Is Student Achievement of the Objectives Demonstrated?

Well-designed performance evaluation techniques provide an useful indicator of each student's ability to achieve the training objectives specified for the course. They also provide a powerful tool for assessing whether the course produces the desired results.

Successful student achievement of training objectives can be demonstrated through various means, including performance on written or skills tests, performance in objective-specific activities individually or as a group, or application of what has been learned in large exercises (or subsequently on the job). In this section you are asked to identify which technique or techniques are used to evaluate student learning. To make the determination, compare the course content covered in the evaluation mechanism with that related to the training objective. If they match, check the appropriate box on the form.

Is Objective Adequately Addressed? Comment As Needed

The heart of this assessment process lies in determining whether the training objectives identified in the HMTA Guidelines have been adequately addressed in the course. For purposes of this assessment, an objective is considered adequately addressed when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills, and attitudes required to accomplish the objective safely and effectively during hazardous materials response.

Note that this analysis requires you to make a subjective evaluation of the adequacy of the course materials to support effective training delivery. Take into account the course time spent on the objective and the results of actual student performance evaluations reviewed previously. Other factors might include the scope of the training covered, methodologies used, clarity of presentation, and level of instructor support. Qualitative factors relating to the art and science of adult training should also be considered. Based on your knowledge of the course, determine whether each objective listed on the worksheet is adequately addressed in the instructional materials. If it would be helpful for other training managers, briefly explain your rationale in the space provided for comments. If the course does not cover a specific learning objective, enter “Not addressed” in the appropriate space.

1997 Response Course Assessment Worksheet

1 Organization Sponsoring Course

National Fire Academy
Federal Emergency Management Agency
16825 South Seton Avenue
Emmitsburg, Maryland 21727

2 Individual to Contact

Contact for further information regarding the course (name, address, phone).

Rob Weiderhold, Hazardous Materials Program Chair
National Fire Academy
(same address)
(301) 447-1000

3 General Course Description

(A) Course Title *Initial Response to Hazardous Materials Incidents*
Course 1: Basic Concepts (IHRMI-BC)

(B) Edition Number and/or Date *August, 1992* (C) Length (hours) *12*

(D) Course Purpose or Goal *The course is designed to address the basic training needs of all first responders, covering basic concepts and techniques of first response and emphasizing the requirements of OSHA 29 CFR 1910.120. The course is the first part of a two course series addressing awareness and operations competencies.*

4 Target Audiences, Competencies, Objectives

See instructions. Check each box if yes. If only selected objectives are addressed, describe. Attach appropriate course assessment worksheets. Continue as needed in Section 10: Special Course Characteristics.

(A) Target Audiences

[X] Course is suitable for all potential responders meeting competency prerequisites.

[ ] Course is targeted for specific disciplines.

- [ ] Fire
- [ ] Law Enforcement
- [ ] EMS
- [ ] Hospital
- [ ] Public Works
- [ ] Private Sector Employees
- [ ] Other _____

(B) Competencies and Objectives Addressed in Course

All Objectives	Selected Objectives	Competencies
[X]	[ ]	First Responder Awareness
[ ]	[X]	First Responder Operations
[ ]	[ ]	Hazardous Materials Technician
[ ]	[ ]	Incident Commander
[ ]	[ ]	Hazardous Materials Branch Chief
[ ]	[ ]	Safety Officer at Hazardous Materials Incidents
[ ]	[ ]	Hazardous Materials Branch Safety Officer
[ ]	[ ]	Specialist Employee
[ ]	[ ]	Private Sector Offsite Specialist Employee B
[ ]	[ ]	Private Sector Offsite Specialist Employee C
[ ]	[ ]	Hazardous Materials Specialist
[ ]	[ ]	Private Sector Offsite Specialist Employee A
[ ]	[ ]	Technician with a Tank Car Speciality
[ ]	[ ]	Technician with a Cargo Tank Speciality
[ ]	[ ]	Technician with an Intermodal Tank Speciality
[ ]	[ ]	Emergency Medical Service Level 1
[ ]	[ ]	Emergency Medical Service Level 2
[ ]	[ ]	Hospital Emergency Room Personnel
[ ]	[ ]	Other

Describe Selected Objectives *(below or in Sec. 10)*

The course exceeds current standards for Awareness, progressing into Operations. (See course assessment worksheets for details).

[X] **Continued in Section 10?**

5 Course Materials

See instructions. Check each box if yes and indicate quantities as requested. Explain as needed in Section 10: Special Course Characteristics.

(A) Instructional Materials

- [X] Instructor Guide (*266* pages)
- [X] Student Manual (*239* pages)
- [X] Handouts (*10* pages)
- [X] Slides (*347* number)
- [ ] Overhead Transparencies (_____ number)
- [X] Videotapes (*3*) number) (*28* total length in minutes)
- [ ] Slide/tapes (____) number) (_____ total length in minutes)
- [ ] Audiotapes (____) number) (_____ total length in minutes)
- [ ] Computer floppy discs (_____ number) (_____ format(s))
- [ ] Computer CDs (_____ number) (_____ format(s))
- [X] Other *DOT Emergency Response Guide*

(B) Evaluation Materials

- [X] Student tests
  - [X] Pretest [ ] End of units [X] End of course
- [ ] Delivery Assessment Instruments
  - [ ] End of units [ ] End of course
- [ ] Other _____

(C) Refresher Training Materials

- [ ] Refresher training guidance included
- [ ] Refresher training materials included

If yes, please describe in Sec. 10 Special Course Characteristics

(D) Physical Skills Laboratory and Demonstration Equipment & Supplies

- [ ] Are standard issue responder equipment and protective gear used in course?
- [ ] Are specialized hazardous materials response equipment and protective gear used in course?
- [ ] Are incident mock-ups, scenario equipment and props use in course (drums, tanks, valve assemblies, etc.)?

Please describe the use of any specialized equipment or supplies in Section 10 Special Course Characteristics

[X] **Continued in Section 10?**

Sample Completed Response Course Assessment

6 *Course Delivery Formats*

See instructions. Check which formats are used to deliver the course. If format varies by module, note which modules apply to each format. Explain as needed in Section 11: Special Course Delivery Considerations..

Check if yes.

- [ ] Independent study use (no instructor)
- [X] Field delivery run by centralized office
- [ ] Broadcast or televised delivery
- [X] Local department/ employer delivery
- [X] Special facility or fixed-site delivery
- [ ] Other _____

If the course is delivered using more than one format, please explain.

The course is designed for easy use in field or local department, and may be used at centralized Academy.

[X] ***Continued in Section 10?***

7 *Unit or Module Summary*

See instructions. Provide module title, length in hours or fraction, and check instructional methodologies employed. Use Section 12: Continuation, if necessary.

Unit / Module Number	Unit / Module Length (in Hours)	Unit / Module Has Potential For Use As Stand-Alone Training Module	Unit / Module Title	Instructional Methodologies Used In Unit/Module: Lecture / Discussion	Skills Demonstration / Performance Modeling	Audiovisual Presentation	Classroom Activities: Individual Student Work	Classroom Activities: Group and/or Table Top Work	Physical Skills Laboratory: Hands-On Student Work	Field Exercises or Drills	Self-Study	Computer-Assisted Instruction	Written Testing: Pre-Test, Unit Tests, Posttest	Other
1	1		*Introduction*	X		X	X							
2	1		*Regulations and Standards*	X										
3	1		*Personal Safety*	X		X		X						
4	1		*Toxicology*	X			X							
5	1.75		*Introduction to Recognition and Identification*	X			X	X						
6	2.2	X	*Site Management and Scene Set-up*	X		X	X	X						
7	.66		*Personal Protective Equipment*	X			X							
8	1		*Decontamination*	X										
9	.5		*Resources*	X			X							
10	1.5		*Course Wrap-up*	X				X						X

[ ] ***Continued in Section 12?***

Side 2 - Response Course Assessment Worksheet **1997**

8 Materials From Other Programs Used In This Course

See instructions. Applies to major sources only. Explain as needed in Section 12: Continuation.

Organization	Title of Program or Course Used	Comment
	None.	*Original development using task analysis based on OSHA 29 CFR 1910.120 and NFPA 472.*
		Some scenarios adapted from other NFA programs.

☐ **Continued in Section 12?**

9 Factors Affecting Use of Course by Other Organizations

See instructions. Check if yes. Explain as needed in Section 11: Special Course Delivery Considerations.

- [X] Do course materials have to be purchased?
- [ ] Do copyright limitations apply to use of the materials?
- [ ] Are there any special instructor skills or experience requirements?
- [ ] Are there any special facility or equipment requirement that would impede another jurisdiction's use of this course?
- [ ] Are there any special competency requirements or prerequisites for students?
- [X] Does a train-the-trainer program exist?
- [X] Are optional activities provided for different disciplines (fire, public works, EMS, etc.)?
- [ ] Are course texts available on computer disc?
- [ ] Are course evaluations available for review?
- [ ] Are summaries of student achievement available for review?
- [X] Do the majority of the scenarios apply to other locales or geographic regions?

[X] **Continued in Section 11?**

10 Special Course Characteristics

See instructions. Identify special or innovative characteristics of the course which would be of interest to other trainers, such as new activity approaches, new videos, unusual content sequencing, etc. If clarifying entries in other sections, identify which sections.

4. The course can be presented in conjunction with Course II: Concept Implementation for more detail and greater depth, covering other competencies of First Responder Operations. Training emphasis is on fire service but is appropriate for other audiences.

5. A 10-question pretest and 25-question posttest (multiple choice) are included. The DOT Emergency Response Guide is used in activities; one copy per student is ideal, although 5-6 copies is adequate for small group work. Slides are used extensively to support lectures and activities.

The course provides a broad overview and introduction to haz mat response concepts, functions and roles. Many individual and small group activities allow students to apply learning to realistic haz mat response situations. An emphasis is placed on defensive operations and personal safety.

All Awareness objectives are adequately met, and most Operations objectives are met.

1997 Response Course Assessment Worksheet - **Side 3**

Sample Completed Response Course Assessment

11 *Special Course Delivery Considerations*

See instructions. Identify training issues, special requirements or challenges not identified elsewhere that would affect another organization using or adapting this course. If clarifying entries in other sections, identify which sections.

6. *The course is designed as a standard National Fire Academy two-day field course for use by Fire departments and other response agencies at the State and local level. In-depth instructor support (lesson plan, slide references, activity instructions, sample discussion questions, etc.) is included. The student manual can be used for self-study after class.*

9. *All course materials (except for the DOT Emergency Response Guide) can be purchased from the National Audiovisual Center for minimal costs. The materials are in the public domain. No special instructor skills or facility/equipment requirements apply. The course assumes no previous haz mat response training for students. A train-the-trainer program was conducted at the National Fire Academy in 1992; no further offerings are currently planned. Many States and metros have conducted further train-the-trainer programs.*

The course activities utilize a range of scenarios that are representative of incidents in various locales and geographic areas. Fire service and EMS functions are emphasized, but the roles of other responders are addressed. Jurisdictions could substitute local scenarios/slides, if desired. The posttest is designed to test the student's grasp of the course content. The State or local agency presenting the course must determine if the test instrument is valid for determining competency within the jurisdiction.

12 *Continuation*

See instructions. Use this section to continue comments that exceed space allowed in other sections. For each comment, identify section being continued.

Side 4- Response Course Assessment Worksheet **1997**

***1997** Response Course Objectives Worksheet*

First Responder Awareness: Required Objectives

Course Title: *Initial Response to Hazardous Materials Incidents: Basic Concepts*

Organization: *National Fire Academy*

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(i), and are abbreviated below as OSHA AWARE-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA AWARE-A *Define hazardous substances and identify risks at hazardous materials incidents.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Definitions, incident levels, zones, hazard types, toxicity, other areas covered.*
OSHA AWARE-B *Identify potential outcomes at hazardous materials incidents.*	Time *n/a*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Many concepts and activities relate to haz mat operations, outcomes throughout course.*
OSHA AWARE-C *Recognize presence of hazardous materials at incidents.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Markings, placards, container types, and other clues are covered.*
OSHA AWARE-D *Identify hazardous substances present at incidents.*	Time *3.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Identification procedures and resources (e.g. ERG, MSDS) are covered.*
OSHA AWARE-E *Understand role of first responder at awareness level in emergency response plan.*	Time *1.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Response roles, planning requirements, SOP's, personal safety, other areas are covered.*
OSHA AWARE-F *Given haz mat incident, determine additional resources needed & notify comm, center.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Resources and notification requirements are covered and applied in activities.*

***1997** Response Course Objectives Worksheet*

First Responder Awareness: Recommended Objectives

Course Title: *Initial Response to Hazardous Materials Incidents: Basic Concepts*

Organization: *National Fire Academy*

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 2: Competencies for the First Responder at the Awareness Level. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
AWARE-1 **NFPA 2-1.3** *Understand role of first responder at the awareness level.*	Time *3.75*	*X*	*X*		*X*				Check if objective is adequately addressed. ☐ Comment: *Personal safety, toxicology, and basic recognition and identification are covered.*
AWARE-2 **NFPA 2-2.1** *Detect the presence of hazardous materials at incidents.*	Time *.66*	*X*			*X*				Check if objective is adequately addressed. ☐ Comment: *Types, protective capabilities, and limitations of PPE's are covered.*
AWARE-3 **NFPA 2-2.2** *Survey incidents from safe location and identify the hazardous materials present.*	Time *n/a*								Check if objective is adequately addressed. ☒ Comment: *Basic concepts, terminology, regulations and standards are covered throughout course.*
AWARE-4 **NFPA 2-2.3** *Analyze incidents and identify the fire, explosion and health hazards for materials present.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. ☐ Comment: *Basic concepts, methods and roles of site management/scene set-up are covered.*
AWARE-5 **NFPA 2-4.1** *Given haz mat incidents, identify actions to protect responders and others and to control access.*	Time *1*				*X*				Check if objective is adequately addressed. ☐ Comment: *Methods, zones and general procedures are covered.*
AWARE-6 **NFPA 2-4.2** *Given haz mat incidents, identify appropriate notification procedures.*	Time *n/a*								Check if objective is adequately addressed. ☐ Comment: *General information is presented throughout, more training on local SOPs is required.*

1997 Response Course Assessment Worksheet

1 Organization Sponsoring Course	2 Individual to Contact — *Contact for further information regarding the course (name, address, phone).*

3 General Course Description

(A) Course Title _____

_____

(B) Edition Number and/or Date _____ (C) Length (hours) _____

(D) Course Purpose or Goal _____

_____

_____

_____

4 Target Audiences, Competencies, Objectives

See instructions. Check each box if yes. If only selected objectives are addressed, describe. Attach appropriate course assessment worksheets. Continue as needed in Section 10: Special Course Characteristics.

(A) Target Audiences

☐ Course is suitable for all potential responders meeting competency prerequisites.

☐ Course is targeted for specific disciplines.

- ☐ Fire
- ☐ Law Enforcement
- ☐ EMS
- ☐ Hospital
- ☐ Public Works
- ☐ Private Sector Employees
- ☐ Other _____

(B) Competencies and Objectives Addressed in Course

All Objectives	Selected Objectives	Competencies
☐	☐	First Responder Awareness
☐	☐	First Responder Operations
☐	☐	Hazardous Materials Technician
☐	☐	Incident Commander
☐	☐	Hazardous Materials Branch Chief
☐	☐	Safety Officer at Hazardous Materials Incidents
☐	☐	Hazardous Materials Branch Safety Officer
☐	☐	Specialist Employee
☐	☐	Private Sector Offsite Specialist Employee B
☐	☐	Private Sector Offsite Specialist Employee C
☐	☐	Hazardous Materials Specialist
☐	☐	Private Sector Offsite Specialist Employee A
☐	☐	Technician with a Tank Car Speciality
☐	☐	Technician with a Cargo Tank Speciality
☐	☐	Technician with an Intermodal Tank Speciality
☐	☐	Emergency Medical Service Level 1
☐	☐	Emergency Medical Service Level 2
☐	☐	Hospital Emergency Room Personnel
☐	☐	Other

Describe Selected Objectives *(below or in Sec. 10)*

_____

_____

_____

☐ **Continued in Section 10?**

5 Course Materials

See instructions. Check each box if yes and indicate quantities as requested. Explain as needed in Section 10: Special Course Characteristics.

(A) Instructional Materials

- ☐ Instructor Guide (_____ pages)
- ☐ Student Manual (_____ pages)
- ☐ Handouts (_____ pages)
- ☐ Slides (_____ number)
- ☐ Overhead Transparencies (_____ number)
- ☐ Videotapes (____) number) (_____ total length in minutes)
- ☐ Slide/tapes (____) number) (_____ total length in minutes)
- ☐ Audiotapes (____) number) (_____ total length in minutes)
- ☐ Computer floppy discs (_____ number) (_____ format(s))
- ☐ Computer CDs (_____ number) (_____ format(s))
- ☐ Other _____

(B) Evaluation Materials

- ☐ Student tests
  - ☐ Pretest ☐ End of units ☐ End of course
- ☐ Delivery Assessment Instruments
  - ☐ End of units ☐ End of course
- ☐ Other _____

(C) Refresher Training Materials

- ☐ Refresher training guidance included
- ☐ Refresher training materials included

If yes, please describe in Sec. 10 Special Course Characteristics

(D) Physical Skills Laboratory and Demonstration Equipment & Supplies

- ☐ Are standard issue responder equipment and protective gear used in course?
- ☐ Are specialized hazardous materials response equipment and protective gear used in course?
- ☐ Are incident mock-ups, scenario equipment and props use in course (drums, tanks, valve assemblies, etc.)?

Please describe the use of any specialized equipment or supplies in Section 10 Special Course Characteristics

☐ **Continued in Section 10?**

6 Course Delivery Formats

See instructions. Check which formats are used to deliver the course. If format varies by module, note which modules apply to each format. Explain as needed in Section 11: Special Course Delivery Considerations..

Check if yes.

- ☐ Independent study use (no instructor)
- ☐ Field delivery run by centralized office
- ☐ Broadcast or televised delivery
- ☐ Local department/ employer delivery
- ☐ Special facility or fixed-site delivery
- ☐ Other _____

If the course is delivered using more than one format, please explain.

_____

_____

_____

☐ **Continued in Section 10?**

7 Unit or Module Summary

See instructions. Provide module title, length in hours or fraction, and check instructional methodologies employed. Use Section 12: Continuation, if necessary.

Unit / Module Number	Unit / Module Length (in Hours)	Unit / Module Has Potential For Use As Stand-Alone Training Module	Unit / Module Title	Instructional Methodologies Used In Unit/Module: Lecture / Discussion	Skills Demonstration / Performance Modeling	Audiovisual Presentation	Classroom Activities: Individual Student Work	Classroom Activities: Group and/or Table Top Work	Physical Skills Laboratory: Hands-On Student Work	Field Exercises or Drills	Self-Study	Computer-Assisted Instruction	Written Testing: Pre-Test, Unit Tests, Post-test	Other

☐ **Continued in Section 12?**

8 Materials From Other Programs Used In This Course

See instructions. Applies to major sources only. Explain as needed in Section 12: Continuation.

Organization	Title of Program or Course Used	Comment

☐ Continued in Section 12?

9 Factors Affecting Use of Course by Other Organizations

See instructions. Check if yes. Explain as needed in Section 11: Special Course Delivery Considerations.

- ☐ Do course materials have to be purchased?
- ☐ Do copyright limitations apply to use of the materials?
- ☐ Are there any special instructor skills or experience requirements?
- ☐ Are there any special facility or equipment requirement that would impede another jurisdiction's use of this course?
- ☐ Are there any special competency requirements or prerequisites for students?
- ☐ Does a train-the-trainer program exist?
- ☐ Are optional activities provided for different disciplines (fire, public works, EMS, etc.)?
- ☐ Are course texts available on computer disc?
- ☐ Are course evaluations available for review?
- ☐ Are summaries of student achievement available for review?
- ☐ Do the majority of the scenarios apply to other locales or geographic regions?

☐ Continued in Section 11?

10 Special Course Characteristics

See instructions. Identify special or innovative characteristics of the course which would be of interest to other trainers, such as new activity approaches, new videos, unusual content sequencing, etc. If clarifying entries in other sections, identify which sections.

11 *Special Course Delivery Considerations*

See instructions. Identify training issues, special requirements or challenges not identified elsewhere that would affect another organization using or adapting this course. If clarifying entries in other sections, identify which sections.

12 *Continuation*

See instructions. Use this section to continue comments that exceed space allowed in other sections. For each comment, identify section being continued.

***1997** Response Course Objectives Worksheet*

First Responder Awareness: Required Objectives

Course Title

Organization

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(i), and are abbreviated below as OSHA AWARE-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA AWARE-A *Define hazardous substances and identify risks at hazardous materials incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-B *Identify potential outcomes at hazardous materials incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-C *Recognize presence of hazardous materials at incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-D *Identify hazardous substances present at incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-E *Understand role of first responder at awareness level in emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-F *Given haz mat incident, determine additional resources needed & notify comm, center.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Response Course Objectives Worksheet - **1997**
First Responder Awareness: Required Objectives

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1997 Response Course Objectives Worksheet

First Responder Awareness: Recommended Objectives

Course Title

Organization

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 2: Competencies for the First Responder at the Awareness Level. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
AWARE-1 **NFPA 2-1.3** *Understand role of first responder at the awareness level.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-2 **NFPA 2-2.1** *Detect the presence of hazardous materials at incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-3 **NFPA 2-2.2** *Survey incidents from safe location and identify the hazardous materials present.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-4 **NFPA 2-2.3** *Analyze incidents and identify the fire, explosion and health hazards for materials present.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-5 **NFPA 2-4.1** *Given haz mat incidents, identify actions to protect responders and others and to control access.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-6 **NFPA 2-4.2** *Given haz mat incidents, identify appropriate notification procedures.*	Time								Check if objective is adequately addressed. ☐ Comment

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1997 Response Course Objectives Worksheet

First Responder Operations: Required Objectives

Course Title

Organization

First Responder Operations training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(ii), and are abbreviated below as OSHA OPS-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA OPS-A *Know basic hazard and risk assessment techniques.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-B *Select and use personal protective equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-C *Define basic hazardous materials terms.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-D *Know basic control, containment, and/or confinement operations.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-E *Know basic decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-F *Know SOPs and termination procedures.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Response Course Objectives Worksheet - **1997**
First Responder Operations: Required Objectives

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***1997** Response Course Objectives Worksheet*

First Responder Operations: Recommended Objectives

Course Title

Organization

First Responder Operations training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 3: Competencies for the First Responder at the Operations Level. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OPS-1 **NFPA 3-1.3** *Understand role of first responder at the operational level.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-2 **NFPA 3-2.1** *Survey the hazardous materials incident.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-3 **NFPA 3-2.2** *Collect hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-4 **NFPA 3-2.3** *Predict behavior of a material and its container.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-5 **NFPA 3-2.4** *Estimate the potential harm within the endangered area.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-6 **NFPA 3-3.1** *Describe response options.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

First Responder Operations: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OPS-7 **NFPA3-3.2** *Identify defensive options.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-8 **NFPA3-3.3** *Determine appropriateness of personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-9 **NFPA3-3.4** *Identify emergency decontamination procedures.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-10 **NFPA3-4.1** *Establish and enforce scene control procedures.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-11 **NFPA3-4.2** *Initiate the incident management system.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-12 **NFPA 3-4.3** *Demonstrate the ability to use personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-13 **NFPA 3-4.4** *Perform defensive control actions.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-14 **NFPA 3-5.1** *Evaluate status of defensive actions.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-15 **NFPA3-5.2** *Communicate the status of the response.*	Time								Check if objective is adequately addressed. ☐ Comment

1997 Response Course Objectives Worksheet

Haz Mat Technician: Required Objectives

Course Title

Organization

Haz Mat Technician training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(iii), and are abbreviated below as OSHA TECH-A through I. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA TECH-A *Know how to implement employer's emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-B *Know classification, identification and verification of known and unknown materials using field survey equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-C *Demonstrate assigned role in incident command system.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-D *Select and use proper specialized personal protective equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-E *Identify and demonstrate use of hazard and risk assessment techniques.*	Time								Check if objective is adequately addressed. ☐
	Comment								

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***1997** Response Course Objectives Worksheet*

Haz Mat Technician: Required Objectives (Continued)

Required Objective		Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
			Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA TECH-F	*Demonstrate advanced control, containment, and/or confinement operations.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA TECH-G	*Identify and demonstrate decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA TECH-H	*List and describe incident termination procedures.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA TECH-I	*Define basic chemical and toxicological terms and describe basic chemical and toxicological behavior.*	Time								Check if objective is adequately addressed. ☐
		Comment								

Response Course Objectives Worksheet - **1997**
Hazardous Materials Technician: Required Objectives

1997 Response Course Objectives Worksheet

Haz Mat Technician: Recommended Objectives

Course Title

Organization

Haz Mat Technician training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter4:Competencies for the Hazardous Materials Technician. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TECH-1 **NFPA 4-1.3** *Understand role of hazardous materials technician.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-2 **NFPA 4-2.1** *Using appropriate equipment, identify special containers, identify of classify unknown materials, verify identification of hazardous materials, and determine concentration.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-3 **NFPA 4-2.2** *Using printed & technical resources, computer data, & monitoring equipment, collect and interpret hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-4 **NFPA 4-2.3** *Describe facility & transportation container damage.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-5 **NFPA 4-2.4** *Predict likely behavior of haz mat in facility and trans. incidents involving multiple haz mat.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Haz Mat Technician: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TECH-6 **NFPA 4-2.5** *Estimate size, shape, & concentration of release, using computer modeling, monitoring equipment and specialists.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-7 **NFPA 4-3.1** *Describe response objectives for facility and transportation incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-8 **NFPA4-3.2** *Identify defensive, offensive and nonintervention action options.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-9 **NFPA 4-3.3** *Determine appropriate personal protective equipment for action options.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-10 **NFPA4-3.4** *Select decontamination procedures and determine equipment required.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-11 **NFPA 4-3.5** *Develop plan of action, including safety consid., consistent with local emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-12 **NFPA 4-4.1** *Perform assigned role within local incident mgmt system.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-13 **NFPA 4-4.2** *Don, work in and doff liquid splash-, vapor-protective, and other specialized personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TECH-14 **NFPA 4-4.3** *Select tools, equipment, and materials and identify precautions for controlling releases.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-15 **NFPA4-5.1** *Evaluate effectiveness of control functions.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-16 **NFPA 4-6.1** *Participate in debriefing of incident.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-17 **NFPA4-6.2** *Provide operational observations of activities performed in hot & warms zones.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-18 **NFPA 4-6.3** *Complete reporting & documentation requirements consistent with SOPs and organization's emer. plan.*	Time								Check if objective is adequately addressed. ☐ Comment

1997-Response Course Objectives Worksheet
Hazardous Materials Technician: Recommended Objectives

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1997 Response Course Objectives Worksheet

Incident Commander: Required Objectives

Course Title

Organization

Incident Commander training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(v), and are abbreviated below as OSHA I.C.-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA I.C.-A *Implement employer's incident command system.* ***A.1*** *Demonstrate establishing command, organizing resources, assigning subordinate units and personnel.* ***A.2*** *Demonstrate transfer of command.* ***A.3*** *Define roles & responsibilities of dafety officer.*	Time								Check if objective is adequately addressed. ☐ Comment
OSHA I.C.-B *Implement employer's emergency response plan* ***B.1*** *Identify substances and describe appropriate site analysis, engineering controls, maximum exposure limits, handling procedures.* ***B.2*** *Determine and describe appropriate emergency operations.*	Time								Check if objective is adequately addressed. ☐ Comment
OSHA I.C.-C *Identify hazards & risks associated with chemical protective clothing.* ***C.1*** *Determine when it is safe to discontinue positive pressure self-contained breathing apparatus.* ***C.2*** *Minimize personnel working in exposure areas.* ***C.3*** *Identify back-up, rescue and qualified basic life support requirements.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Incident Commander: Required Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA I.C.-D *Demonstrate implementation of local emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA I.C.-E *Know State emergency response plan and Federal regional response team.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA I.C.-F *Identify and demonstrate management of decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Response Course Objectives Worksheet - **1997**
Incident Commander: Required Objectives

1997 Response Course Objectives Worksheet

Incident Commander: Recommended Objectives

Course Title

Organization

Incident Commander training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 5: Competencies for the Incident Commander. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
I.C.-1 **NFPA5-1.3** *Understand role of hazardous materials incident commander.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-2 **NFPA 5-2.1** *Using printed & technical resources, computer data, and monitoring equipment, collect and interpret hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-3 **NFPA 5-2.2** *Estimate potential outcomes within endangered area of facility and transportation incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-4 **NFPA 5-3.1** *Describe response objectives for facility and transportation incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-5 **NFPA5-3.2** *Identify defensive, offensive, and nonintervention action options.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-6 **NFPA 5-3.3** *Approve appropriate personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Incident Commander: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
I.C.-7 **NFPA5-3.4** *Develop plans of action for facility and transportation incidents, consistent with local emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-8 **NFPA5-4.1** *Identify requirements of local emergency response plan.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-9 **NFPA 5-4.2** *Demonstrate ability to direct resources in a safe and efficient manner.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-10 **NFPA5-4.3** *Identify appropriate information to provide to media and public officials.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-11 **NFPA5-5.1** *Evaluate progress of plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-12 **NFPA 5-6.1** *Demonstrate ability to effectively transfer command.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-13 **NFPA 5-6.2** *Given details of haz mat incident, conduct a debriefing of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-14 **NFPA5-6.3** *Given details of multi-agency haz mat incident, conduct a critique of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-15 **NFPA5-6.4** *Report and document incidents consistent with local, State and Federal requirements.*	Time								Check if objective is adequately addressed. ☐ Comment

1997 Response Course Objectives Worksheet

Haz Mat Branch Officer: Recommended Objectives

Course Title

Organization

Haz Mat Branch Officer recommended objectives have their origin primarily in NFPA 472, Chapter 7: Competencies for the Hazardous Materials Branch Officer. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
HMBO-1 **NFPA 7-1.3** *Understand the role of hazardous materials branch officer.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-2 **NFPA7-2.1** *Given a haz mat incident, estimate potential outcomes within endangered areas.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-3 **NFPA 7-3.1** *Select appropriate personal protective equipment for action options specified in plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-4 **NFPA 7-3.2** *Develop a plan of action consistent with local emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-5 **NFPA 7-4.1** *Identify requirements of plan, including notification procedures and use of nonlocal resources.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-6 **NFPA 7-4.2** *Direct haz mat branch resources in safe and efficient manner.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Haz Mat Branch Officer: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
HMBO-7 **NFPA7-4.3** *Act as resource, provide information to incident commander or public info officer.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-8 **NFPA7-5.1** *Evaluate the progress of the plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-9 **NFPA 7-6.1** *Terminate the emergency phase of incident consistent with local emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-10 **NFPA 7-6.2** *Given details of incident, conduct debriefing of incident.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-11 **NFPA 7-6.3** *Given details of incident, conduct a critique of incident.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-12 **NFPA7-6.4** *Report & document the incident, consistent with local, State, and federal requirements.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
Hazardous Materials Branch Officer: Recommended Objectives

1997 Response Course Objectives Worksheet

Safety Officer at Haz Mat Incidents: Required Objectives

Course Title

Organization

Training courses for the safety officer function may be assessed using either the required objectives for Safety Officer at Hazardous Materials Incidents or the recommended objectives for Hazardous Materials Branch Safety Officer in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(vii-viii), and are abbreviated below as OSHA S.O.-A through C. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective		Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
			Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA S.O.-A	*Identify and evaluate hazards at incident and provide direction to development of a safe response plan.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA S.O.-B	*Identify and evaluate unsafe operations activities, and/or conditions involving imminent danger.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA S.O.-C	*Given unsafe conditions, determine appropriate interventions, incl. altering, suspending or terminating selected response activities and coordinate those interventions with individual in charge of ICS.*	Time								Check if objective is adequately addressed. ☐
		Comment								

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1997 Response Course Objectives Worksheet

Haz Mat Branch Safety Officer: Recommended Objectives

Course Title

Organization

Training courses for the safety officer function may be assessed using either the required objectives for Safety Officer at Hazardous Materials Incidents or the recommended objectives for Hazardous Materials Branch Safety Officer in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 8: Competencies for the Haz Mat Branch Safety Officer. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
S.O.-1 **NFPA 8-1.3** *Understand role of the hazardous materials branch safety officer.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-2 **NFPA 8-2.1** *Given a haz mat incident, observe a scene and review and evaluate hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-3 **NFPA 8-3.1** *Given a haz mat incident, assist in planning a safe response.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-4 **NFPA 8-3.2** *Given a haz mat incident, provide observation-based recommendations regarding considerations for safety of on-site personnel.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-5 **NFPA 8-3.3** *Given a haz mat incident, assist in development of safe plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-6 **NFPA 8-3.4** *Identify safety precautions for plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Haz Mat Branch Safety Officer: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
S.O.-7 **NFPA 8-3.5** *Review selection of personal protective equipment required for a given action.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-8 **NFPA 8-3.6** *Review plan to identify safety considerations prior to plan implementation.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-9 **NFPA 8-3.7** *Review the EMS plan to ensure response personnel are provided medical care.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-10 **NFPA 8-4.1** *Perform duties consistent with local emer. response plan, SOPs and safety considerations.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-11 **NFPA 8-4.2** *Ensure personnel perform their tasks in safe manner by identifying safety considerations for control functions identified in plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-12 **NFPA 8-4.3** *Demonstrate proper procedure for conducting safety briefings.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-13 **NFPA 8-4.4** *Given a haz mat incident, assist in implementing and enforcing the safety considerations.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-14 **NFPA 8-4.5** *Maintain routine and emergency communication within the incident command structure.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
Hazardous Materials Branch Safety Officer: Recommended Objectives

Continue On Next Page

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
S.O.-15 **NFPA 8-4.6** *Identify whether team members regularly communicate status of work assignments.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-16 **NFPA 8-4.7** *Given a haz mat incident, assist in implementing exposure monitoring.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-17 **NFPA 8-5.1** *Evaluate the progress of the planned response.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-18 **NFPA 8-5.2** *Take corrective actions as necessary to ensure safety and health of persons in hot and warms zones.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-19 **NFPA 8-6.1** *Complete and submit reports, documentation and follow-up required.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-20 **NFPA 8-6.2** *Debrief haz mat branch personnel regarding site-specific occupational safety and health issues.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-21 **NFPA 8-6.3** *Provide safety and health related critical observations of activities performed in hot and warm zones.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Specialist Employee: Required Objectives

Course Title

Organization

Specialist Employee training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(5), and are abbreviated below as OSHA SpEMP-1 through 3. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA SpEMP-1 *Given haz mat incident within area of technical expertise, provide technical advice or assistance within the incident command structure regarding the hazards of the substance and the magnitude of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment _____
OSHA SpEMP-2 *Given haz mat incident within area of technical expertise, provide technical advice or assistance within the incident command structure regarding potential response options.*	Time								Check if objective is adequately addressed. ☐ Comment _____
OSHA SpEMP-3 *Given haz mat incident within area of technical expertise, provide technical advice or assistance within the incident command structure to control, confinement and containment operations and to incident termination and evaluation activities.*	Time								Check if objective is adequately addressed. ☐ Comment _____

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1997 Response Course Objectives Worksheet

Specialist Employee: Recommended Objectives

Course Title

Organization

Specialist Employee training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 6: Competencies for Private Sector Specialist Employees, Section 6.2: Private Sector Specialist Employee C, and Section 6.3: Private Sector Specialist Employee B. To retain the integrity of the NFPA citations, the objectives are referred to respectively as SPEC(C) and SPEC(B), and are presented as separate groupings of objectives. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Private Sector Specialist Employee C

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(C)-1 **NFPA 6-2.1.3** *Demonstrate an understanding of the role of the private sector specialist employee C.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(C)-2 **NFPA 6-2.2.1** *Given an MSDS or other appropriate resource, advise the incident commander of the hazards and harmful effects of chemicals used in are of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(C)-3 **NFPA 6-2.2.2** *Advise the incident commander of characteristics of containers for chemicals used in area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(C)-4 **NFPA 6-2.3.1** *Advise the incident commander of response information for chemicals used in area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Private Sector Specialist Employee C

Private Sector Spec. Employee B On Next Page

***1997** Response Course Objectives Worksheet*

Specialist Employee: Recommended Objectives

Private Sector Specialist Employee B

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(B)-1 **NFPA 6-3.1.3** *Given an incident involving haz mat within the individual area of specialization, define the role and responsibilities of the private sector specialist employee B.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-2 **NFPA 6-3.2.1** *Given a chemical within area of specialization and a MSDS or appropriate resource, advise the incident commander of the chemical's hazards & harmful effects and potential consequences based on the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-3 **NFPA 6-3.2.2** *Given a container for chemicals within area of specialization, advise the incident commander of the characteristics and potential behavior of that container.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-4 **NFPA 6-3.2.3** *Given a chemical in area of specialization and the applicable monitoring equipment or the available predictive capabilities, advise the incident commander of the concentrations of the released chemical and the implications of that information to the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-5 **NFPA 6-3.3.1** *Given specific chemicals or containers within area of specialization and the appropriate resources, advise the incident commander of the potential response options and their consequences.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Private Sector Specialist Employee B (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(B)-6 **NFPA 6-3.3.2** *Given specific chemical and/or containers for chemicals within area of specialization and the appropriate resources, advises the incident commander of the appropriate personal protective equipment necessary for various response options.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-7 **NFPA 6-3.3.3** *Given a specific chemical within area of specialization and the available resources, identify appropriate decontamination methods for various response options.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-8 **NFPA 6-3.3.4** *Given a specific chemical within area of specialization and the available resources, advise the incident commander of federal or provincial regulations that relate to the handling, transportation, and/or disposal of that chemical.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-9 **NFPA 6-3.3.5** *Given a simulated incident involving chemicals and/or containers used in area of specialization, develop a plan of action (in conjunction with the incident commander), consistent with organization's emer. response plan and SOPs, for handling chemicals and/or containers in that incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-10 **NFPA 6-3.4.1** *Given an assignment by the incident commander within area of specialization, perform the assigned actions consistent with his or her organization's emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

***1997** Response Course Objectives Worksheet*

Specialist Employee: Recommended Objectives

Private Sector Specialist Employee B

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(B)-11 **NFPA 6-3.4.2** *Given an assignment by the incident commander within area of specialization, don, work in, and doff the appropriate personal protective equipment needed to implement the assigned response options, consistent with organization's emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-12 **NFPA 6-3.5.1** *Given an incident involving specific chemicals and/or containers for chemicals within area of specialization, advise the incident commander of the effectiveness of the selected response options.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-13 **NFPA 6-3.5.2** *Given a simulated incident involving chemicals and/or containers for chemicals used in area of specialization, complete the reporting and subsequent documentation requirements consistent with organization's emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
Specialist Employee (Private Sector Specialist Employee B: Recommended Objectives

1997 Response Course Objectives Worksheet

Haz Mat Specialist: Required Objectives

Course Title

Organization

Haz Mat Specialist training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(iv), and are abbreviated below as OSHA HMSPEC A through I. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA HMSPEC-A *Implement the local emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-B *Understand the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-C *Describe the State emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-D *Select and demonstrate use of proper specialized chemical personal protective equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-E *Understand in-depth hazard and risk assessment techniques, and provide technical advice or assistance regarding hazards & potential magnitude of incident.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Continue On Next Page

***1997** Response Course Objectives Worksheet*

Haz Mat Specialist:
Required Objectives (Continued)

Required Objective		Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
			Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA HMSPEC-F	*Demonstrate specialized control, containment, and/or confinement operations.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA HMSPEC-G	*Demonstrate the ability to determine and implement decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA HMSPEC-H	*Demonstrate the ability to develop a site safety and control plan.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA HMSPEC-I	*Define chemical, radiological and toxicological terms and describe chemical, radiological and toxicological materials behavior.*	Time								Check if objective is adequately addressed. ☐
		Comment								

Response Course Objectives Worksheet - **1997**
Hazardous Materials Specialist: Required Objectives

1997 Response Course Objectives Worksheet

Course Title

Organization

Haz Mat Specialist: Recommended Objectives

Hazardous Materials Specialist training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 6: Competencies for Private Sector Employees, Section 6.4: Private Sector Specialist Employee A; Chapter 9: Competencies for the Technician with a Tank Car Speciality; Chapter 10: Competencies for the Technician with a Cargo Tank Specialty; and Chapter 11: Competencies for the Technician with an Intermodal Tanks Specialty. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Private Sector Specialist Employee A

NFPA 472, Chapter 6.4

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(A)-1 **NFPA6-4.1.3** *Define the roles and responsibilities of the private sector specialist employee A.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-2 **NFPA 6-4.1.3(a)** *Analyze the chemicals and containers for chemicals used in org's area of specialization to determine the magnitude of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-3 **NFPA 6-4.1.3(b)** *Plan a response to an incident involving chemicals used in org's area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-4 **NFPA 6-4.1.3(c)** *Implement the planned response to an incident involving chemicals and containers used in org's area of specialization consistent with org's emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-5 **NFPA 6-4.1.3(d)** *Evaluate the results of the response to an incident involving chemicals and containers for chemicals used in area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Private Sector Specialist Employee A

Tech. Tank Specialities On Next Pages

Technician with a Tank Car Specialty

NFPA 472, Chapter 9

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TANK-1 **NFPA 9-1.3** *Understand the role of technician with a tank car specialty.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-2 **NFPA 9-2.1** *Given examples of damaged tank cars, describe type and extent of damage to each tank car and its fittings.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-3 **NFPA 9-2.2** *Predict the likely behavior of the tank car and its contents.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-4 **NFPA 9-3.1** *Given an analysis of an emergency involving tank cars, determine response options for each involved.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-5 **NFPA 9-4.1** *Implement selected response options safely and effectively.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Technician with a Tank Car Speciality

Cargo Tank and Intermodal Tank Specialities On Next Pages

Technician with a Cargo Tank Specialty

NFPA 472, Chapter 10

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
CARGO-1 **NFPA 10-1.3** *Understand the role of technician with a cargo tank specialty.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-2 **NFPA 10-2.1** *Given examples of damaged cargo tanks, describe type and extent of damage to each cargo tank and its fittings.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-3 **NFPA 10-2.2** *Predict the likely behavior of the cargo tank and its contents.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-4 **NFPA 10-3.1** *Given an analysis of an emergency involving cargo tanks, determine response options for each involved.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-5 **NFPA 10-4.1** *Implement selected response options safely and effectively.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Technician with a Cargo Tank Speciality

Technician with an Intermodal Tank Speciality On Next Page

Technician with an Intermodal Tank Specialty

NFPA 472, Chapter 11

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
INTML-1 **NFPA 11-1.3** *Understand the role of technician with an intermodal tank specialty.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-2 **NFPA 11-2.1** *Given examples of damaged intermodal tank, describe type and extent of damage to each intermodal tank and its fittings.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-3 **NFPA 11-2.2** *Predict the likely behavior of the intermodal tank and its contents.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-4 **NFPA11-3.1** *Given an analysis of an emergency involving intermodal tank, determine response options for each involved.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-5 **NFPA 11-4.1** *Implement selected response options safely and effectively.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Technician with a Intermodal Tank Speciality

1997 Response Course Objectives Worksheet

EMS Responder Level 1: Recommended Objectives

Course Title

Organization

EMS Responder Level 1 recommended objectives have their origin primarily in NFPA 473, Chapter 2: Competencies for EMS/HM Level 1 Responders. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(1)-1 **NFPA 2-1.3** *Demonstrate an understanding of the role of the emergency medical services responder level 1.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-2 **NFPA 2-2.1** *Determine hazards to responder and patient.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-3 **NFPA 2-2.2** *Assess patient to determine risk of secondary contamination.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-4 *Know facilities in local area capable of handling contaminated patients.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-5 **NFPA 2-3.1** *Describe role of EMS level 1 responder as identified in local emergency response plan or organization's SOPS.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-6 **NFPA 2-3.3** *Provide appropriate level of emergency medical care as specified by authority having jurisdiction.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

1997 Response Course Objectives Worksheet

EMS Responder Level 1: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(1)-7 **NFPA 2-4.1** *Perform preparations necessary to treat and transport patients.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-8 **NFPA 2-4.2** *Demonstrate ability to administer proper treatment to patient.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-9 **NFPA 2-4.3** *Demonstrate ability to transport patient to appropriate facility.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-10 *Describe patient decontamination process.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-11 **NFPA 2-5.1** *Perform reporting, documentation, and follow-up required of EMS component according to local emer. response plan.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
EMS Responder Level 1: Recommended Objectives

1997 Response Course Objectives Worksheet

EMS Responder Level 2: Recommended Objectives

Course Title

Organization

EMS Responder Level 2 recommended objectives have their origin primarily in NFPA 473, Chapter 3: Competencies for EMS/HM Le vel 2 Responders. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(2)-1 **NFPA 3-1.3** *Demonstrate an understanding of the role of emergency medical service responder level 2*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-2 **NFPA 3-2.1** *Given a haz mat incident, determine the hazards present to both the responder and the patient in that situation.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-3 **NFPA 3-2.2** *Given a haz mat incident, assess the patient and conditions to determine risk of secondary contamination.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-4 **NFPA 3-3.1** *Given a plan of action by the incident commander and EMS role in haz mat incident, describe importance of coordination between agencies at the scene.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-5 **NFPA 3-3.2** *Given a haz mat incident, plan a response to provide appropriate level of emergency medical care to persons involved and to provide medical support to haz mat response personnel.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

EMS Responder Level 2
Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(2)-6 **NFPA 3-3.3** *Given the name of the hazardous material and the type, duration, and extend of exposure, determine if the protective clothing and equipment available to EMS personnel is appropriate to implement the planned response.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-7 **NFPA 3-4.1** *Given a plan for providing patient care at a haz mat incident, perform the preparations necessary to receive the patient for decontamination, treatment, and transport; and demonstrate proper donning, doffing and usage of personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-8 **NFPA 3-4.2** *Provide or coordinate patient care.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-9 **NFPA 3-4.3** *Demonstrate the ability to coordinate patient care activities, including, treatment, disposition, and transportation of patients.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-10 **NFPA 3-4.4** *Perform medical support of haz mat incident response personnel.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-11 **NFPA 3-5.1** *Given the termination of a haz mat incident, complete the reporting, documentation, and EMS termination activities as required by the local emergency response plan or org's SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
EMS Responder Level 2: Recommended Objectives

1997 Response Course Objectives Worksheet

Hospital Personnel: Recommended Objectives

Course Title

Organization

Hospital Personnel recommended objectives have their origin primarily in the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) standards for handling contaminated patients. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
HOSP-1 *Describe the ways in which a medical center or hospital can become involved in a haz mat event or response effort.*	Time								Check if objective is adequately addressed. ☐ Comment
HOSP-2 *Describe some of the key issues involved in the reception of a patient contaminated by or exposed to a chemical substance.*	Time								Check if objective is adequately addressed. ☐ Comment
HOSP-3 *Describe the need for the hospital to develop emergency response plans.*	Time								Check if objective is adequately addressed. ☐ Comment
HOSP-4 *Describe the hospitals documented management plan for the environment of care to be provided during a haz mat emergency that considers all factors of the emergency response.*	Time								Check if objective is adequately addressed. ☐ Comment

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Hazardous Materials
Planning Course Assessment

Planning Course Assessment
DIRECTIONS

These instructions describe the methodology for assessing hazardous materials planning courses. Section 1, **General Information**, explains the purpose and nature of the assessment process. Section 2, **Performing a Course Assessment**, identifies basic steps for completing the assessment instruments. Section 3, **Specific Instructions**, provides block-by-block directions for filling out the instruments. A completed sample is attached, showing the assessment of the National Fire Academy course *Initial Response to Hazardous Materials Incidents: Basic Concepts*.

Every effort has been made to keep these instruments and instructions as simple and useful as possible. However, assessing adult training activities inherently involves some time and work.

1. GENERAL INFORMATION

Purpose of the Planning Course Assessment Worksheet

The Response Course Assessment Worksheets are designed to (1) gather descriptive information about individual hazardous materials training activities in a standardized format, and (2) facilitate comparison of course content with the recommended training requirements identified in the Hazardous Materials Emergency Preparedness (HMEP) grant program document *Guidelines for Public Sector Hazardous Materials Training (Guidelines)*. The data can be used to:

- Evaluate the scope of existing courses relative to Federal and other national standards and guidelines.
- Disseminate information to state and local training managers nationwide about existing courses.
- Help training agencies assess the usefulness of existing courses for their own needs.

Why Assess Planning Courses?

State and local agencies with hazardous materials training responsibilities can use the results of the assessment process for the purpose of:

1. Certifying compliance and/or verifying compatibility of training with the HMEP grant program curriculum Guidelines.
2. Analyzing and revising the current training plan.
3. Developing new courses or revising current ones to address unmet training needs.
4. Assessing whether to adopt or adapt an outside course for use within the organization or jurisdiction.

6. Communicating characteristics of existing courses to peer training managers in other organizations and jurisdictions.

7. Evaluating the capabilities of currently trained State and local personnel involved in planning.

8. Documenting and explaining the scope of training activities to outside decision-makers and the public.

The training needs of individual agencies or jurisdictions may differ from those defined here. Many factors that affect the quality of training are outside the scope of this assessment process. Training managers may supplement the results of this assessment process through peer instructor evaluation of deliveries, professional review of course materials, in-depth student and instructor interviews, student testing, and other forms of expert opinion.

Who Should Complete a Planning Course Assessment?

A course assessment should be conducted by any organization with hazardous materials planning training requirements.

All courses used in the HMEP grant program should be assessed. This includes Federal, State, tribal, and Protectorate, national professional association, and private sector courses used by grantees in their public sector training curriculums. Each course should be formally assessed by only one sponsoring organization.

HMEP grantees are responsible for assessing those courses in their curriculums (1) which they have developed entirely or modified for their specific use and (2) which are provided by private sector sources and contractors (other than national associations) and are used by the HMEP grantees use as part of their public sector curriculum. HMEP grantees are not responsible for assessing Federal, national association courses, or courses from other HMEP grantee curriculums. Federal and national association providers of training will be asked to provide assessment of their respective programs which are in use by HMTA grantees.

Assessment Evaluator Qualifications

It is recommended that assessment evaluators have the following minimum qualifications:

- A thorough understanding of the course purpose, training objectives, content, and instructional methodologies.

- Be familiar with the course delivery requirements, related administrative considerations, and student evaluation results.

- Have in-depth knowledge of all target training audiences, including their planning roles, job tasks, and required competencies.

- Have knowledge of hazardous materials planning processes, responsibilities, and applicable regulations and standards including those promulgated by OSHA, EPA, and NFPA.

- Have experience and credentials in applying the principles and techniques of adult education to emergency services and planning audiences.

Given the nature of the assessment process, sponsoring organizations may wish to consider using a workgroup approach, particularly for major courses. Assessment evaluators may include members of the course design and development team; experienced instructors, training program administrators, and course managers; qualified members of the training audience; and other hazardous materials experts as deemed appropriate.

2. PERFORMING A PLANNING COURSE ASSESSMENT

Initial Considerations

Before filling out the assessment instruments, participants should understand the purpose and requirements of the assessment process, and be familiar with the HMEP *Guidelines*.

The first step is to determine the desired depth of the analysis. Generally, one set of assessment instruments is completed for each course. If a course is comprised of major modules or sections that could serve as stand-alone courses in themselves it may be desirable to complete a separate set of instruments for each of those modules or sections of the course.

To decide the appropriate level of assessment consider the possible ways other emergency services organizations may use the training, the information, and decision-making needs of peer training managers. If, in your judgement, a significant number of agencies would benefit by more detailed information, complete one set of instruments for each major module or section of the course. Otherwise, fill out one set of instruments for the entire course.

General Steps in the Process

You are now ready to begin the course assessment. Following the general steps listed below will help you prepare the forms quickly and accurately.

Step 1: Review Course Training Materials — Gather and review all course instructional materials. These may include plans of instruction, content outlines, student manuals, instructor guides, audiovisual presentations (films, videotapes, slide-tapes, etc.), job aids, reference materials, and handout materials.

Step 2: Review Course Delivery Data — Gather and review materials that describe the effectiveness of previous course deliveries. These may include data on course offerings and participants, student and instructor training evaluations, student test summaries, and long-term performance evaluation results. You may interview or survey persons knowledgeable about course deliveries.

Step 3: Gather Related Documents — Obtain copies of other documents that may be useful in the course assessment process. Examples might include related federal legislation and regulations, copies of relevant NFPAstandards, source materials used in the development of the course, refresher training and train-the-trainer materials, course promotional materials, technical documents referenced in the course.

Step 4: Select Appropriate Instruments — Each course assessment requires filling out two separate instruments:

- **Planning Course Assessment Worksheet** describes the course and related delivery considerations. The basic format of the instrument is the same for all training activities assessed under this process. Copies of the instrument can be made from the master copy accompanying these instructions.

- **Planning Course Objectives Worksheet(s)** assesses course content relative to the HMEP *Guidelines*, and identifies the rrecommended training objectives for all competency areas addressed in the course. Separate Course Objectives Worksheets are available for the following competency areas:

  Planning Orientation
  Planning Essentials
  Planning Specialities
    Commodity Flow Study
    Hazard Analysis
    Capability Assessment
    Planning for Protective Actions
    Plan Implementation and Maintenance
    Facility Planning
    Planning for Public Educaiton

  You should complete a separate Course Objectives Worksheet for each competency area addressed in the course. Make copies of the appropriate worksheets from the master copies accompanying these instructions. (More information is provided under Specific Instructions, Planning Course Assessment Worksheet.)

Step 5: Fill in the Instruments — The block-by-block instructions for the instruments begin below. If more space is needed for your answers, use Section 12, Continuation, and attach separate sheets, as needed.

For most courses, the process can take approximately one to two hours per day of training depending on the complexity of the course, the number of people participating, their familiarity with the instructional materials, the desired workgroup process, and other factors.

Step 6: Using the Completed Instruments — The completed instruments should be filed as documentation of your organization's finished HMEP self-assessment of response courses. They can also be used to review your curriculum for completeness and to support dialogue with other training systems regarding your programs. For submission of the information into the HMEP Course Assessment Project, please use the enclosed return envelope or equivalent and send copies of the completed Response Course Assessment Worksheet with Course Objectives Worksheets attached for each course assessed to:

William Lewis
HMEP Course Assessment Project
National Emergency Training Center, FEMA
16825 South Seton Avenue
Emmitsburg, MD 21727

If you have any questions or would like assistance in completing your course assessment, call William Lewis (301) 447-1009, or Jennifer Krietz (301) 447-1585, or FAX (301) 447-1588.

3. SPECIFIC INSTRUCTIONS

This section provides detailed instructions for filling out the Planning Course Assessment Worksheet and the Course Objectives Worksheet. A completed sample of the instruments is attached. Please read these directions carefully as you proceed.

Planning Course Assessment Worksheet

Block 1: Organization Sponsoring Course

Enter the name and address of the Sponsoring Organization (the agency that has primary responsibility for the design and content of the course, and which maintains associated rights) in Block 1. Include subdivision titles, as appropriate.

Block 2: Individual to Contact

Enter the name, mailing address, and phone number of a person assigned to serve as a contact for federal agencies, State and local training managers, and others interested in learning more about the course. This person should be knowledgeable about the course and able to answer questions about the assessment process and results.

Block 3: General Course Description

A. Course Title — Enter the complete formal title of the course, including subtitles.

B. Edition Number and/or Date — Enter the official course number or edition/revision number and date which is used to identify the course. This number typically appears on the cover or title page of the instructional materials.

The identifying number should refer to the entire course, not separate elements such as the student manual, instructor guide, or videotapes. Do not list the International Standard Book Number (ISBN), Library of Congress Catalog Card Number, or other publishing reference number. For published works, enter the most recent publication date, but not the date of later reprintings (if any).

C. Length (hours) — Enter the length or duration of classroom hours per course. Course length includes all educational activities that are part of the course.

D. Course Purpose or Goal — The course purpose or goal is a brief statement (one to three sentences) that broadly defines the desired outcome(s) of the total educational experience, and attempts to clarify the competencies or capabilities that students should possess after having satisfactorily completed all course requirements. This goal is met when all training objectives identified for the course have been achieved. As a rule of thumb, consider how best to complete the sentence “Having successfully completed the course, students will be able to....”

Block 4: Target Audiences, Competencies and Objectives

A. Target Audiences — For purposes of this assessment, target audiences are broadly defined as groups with similar organizational missions in hazardous materials planning. These include emergency management personnel, emergency services personnel, public works personnel, public officials, private sector representatives, and others.

Identify the target audience categories for which this course is suitable by checking the appropriate boxes on the form. List other audiences that would benefit by this training.

B. Competencies and Objectives Addressed in Course — Competency areas are defined as the different planning roles that public sector employees may be required to perform as participants in the planning process at the local, state and federal levels. The competency areas listed on the assessment form follow the categories identified in the HMEP *Guidelines*.

An individual course may address parts of a competency area, a total competency area, or multiple competency areas. To determine which competency area(s) your course addresses, you must first compare the course content with the training objectives identified for each area. The objectives are listed in the HMEP *Guidelines* and are duplicated on the respective Course Objectives Worksheets.

After determining which competency areas your course addresses, check the appropriate boxes on the form. If the course addresses all the objectives in the competency area check "All"; if the course addresses only a portion of them check "Selected". You may need to check one or more competency areas. If you check "Selected" for any competency area, briefly explain the scope of the course in the space provided on the form. If more space is needed, continue in section 10: Special Course Characteristics. (Note: the description you provide should expand on and clarify the course purpose or goal statement entered in Block 3.)

Reminder: Fill out Course Objectives Worksheets for each competency area you check here, whether "All" or "Selected."

Block 5: Course Materials

A. Instructional Materials — Check the appropriate boxes to indicate which of the listed types of instructional materials are used in delivering the course. Enter the correct quantities for each type of material, as specified on the form. If separate refresher training materials are available, please describe them in Section 10: Special Course Characteristics. List other types of instructional materials used in the course (e.g., job aids, reference documents, films, computer software) in the space provided, continuing as necessary in Section 10: Special Course Characteristics.

B. Training Evaluation Materials — Check the appropriate boxes to indicate which of the listed types of evaluation materials are used in the course. If evaluation approaches other than student tests or instructor/student assessments are used, describe fully in Section 10: Special Course Characteristics.

C. Refresher Training Materials— Check the appropriate boxes to indicate whether refresher training guidance and/or materials are included in the course package. Describe focus, scope and competency priorities of any refresher training components in Section 10: Special Course Characteristics

D. Demonstration Equipment and Supplies — If special equipment or supplies are used in the delivery of the course, check the appropriate box(es) and explain briefly in Section 10: Special Course Characteristics. These materials include any props, tools, supplies, apparatus, equipment, computer display systems, or other instructional aids that would not be readily available in a typical training environment.

Block 6: Course Delivery Formats

Courses are designed for use in certain settings or environments, depending on the resources required for delivery, nature of the instruction, size and location of the target audience, cost considerations, and many other factors. Typical formats for planning training include:

- Independent student use — self-contained educational materials designed for use by individual target audience members without ongoing instructor support. (Note: this category includes computer-assisted instruction and interactive videodisc presentations).

- Local department/employer delivery — training that can be delivered by public sector organizations with the resources and capabilities commonly available at the local level.

- Field delivery run by centralized office — training delivered locally, but administered and perhaps staffed by a centralized facility, such as the Emergency Management Institute, State Fire Marshal's office, regional training academy, or private university.

- Special facility or fixed-site delivery — training that must be conducted on-site at a specific facility because it employs large, non-transportable equipment (such as large table top displays, specialized simulation structures, etc.) or because other instructional considerations (such as co-locating with another program) restrict delivery of the course to the specific site.

- Broadcast or televised delivery — training designed for delivery to groups of students via teleconference, broadcast television, closed-circuit television, radio, or other similar instructional media.

Check the box for the delivery format that applies to the course. In most cases, only one delivery format should be marked. Sometimes, however, multiple delivery formats may be possible for the same course (e.g., local department/employer delivery or field delivery run by a centralized office). In other cases, different modules may be delivered using different instructional formats. If more than one delivery format applies, check the appropriate boxes and explain briefly.

Block 7: Unit or Module Summary

Use Block 7 to list the major modules, units, chapters, or sections of the course. Include the unit/module number, planned or expected duration in hours (see the instructions for Block 3), and title. If the sum of the hours shown here does not match the total for the course reported in Block 3, explain in Section 10, Special Course Characteristics.

For each unit/module, indicate whether it could serve in other curriculums as a stand-alone module. The purpose of this information is to assist other training managers in determining whether the material could be incorporated into their programs. In general, a unit has potential as a stand-alone training module if (1) there is closure within the unit of student learning including demonstration of mastery of the material, and (2) if the material is not dependent for coherency or learning upon the unique sequence of content in the preceding and following units of the course.

In addition, identify the types of instructional methodologies used in each unit/module by checking one or more of the boxes on the form. Check other methodologies (e.g., role play, interactive videodisc, behavior modeling, etc.) in the space provided.

Block 8: Materials From Other Programs Used in Course Development

Source materials are training programs, job task analyses, research reports, technical manuals, etc. that are used in developing the course. By identifying these source materials it will help peer training managers and others to:

- Understand the course based on familiarity with the source materials.
- Identify similarities and differences among training activities and programs.
- Evaluate appropriate applications of the course.

In this section of the form, you are asked to identify major source materials used in developing the course. Include only those materials that were used extensively or that contributed significantly to the final form and content of the course. Do not list others whose impact was less important, even if they were researched as part of the course design and development process. For each major source material, fill in the title and the

name of the organization that developed it. Then list the module/unit numbers (from Block 7) of the course that were strongly influenced by the source material. If the source material applies to the entire course, write "all." Explain as necessary in Section 12: Continuation.

Block 9: Factors Affecting Use of Course By Other Organizations

Many factors must be weighed when considering whether to adopt or adapt an existing course: associated costs, delivery requirements, compatibility with mission and audiences, ability to modify, available support services, ease of use. This section of the assessment form includes a checklist of these factors to help other training managers make decisions about using the course for their own needs.

Review the questions and check the appropriate box for each one that you answer affirmatively. Then, using this checklist as a "mind jogger," write in Section 11: Special Delivery Characteristics a brief summary of all major factors that could affect use of the course by other agencies. In your narrative, try to address typical decision-making needs and obstacles faced by training managers in emergency services organizations when developing, adapting, or conducting training. If more space is needed, use Section 12, Continuation.

Blocks 10-12

Use Blocks 10-12 to complete your response to other sections of the form (see the instructions for Blocks 4 through 9). Keep your responses as clear as possible.

Planning Course Objectives Worksheets

The Planning Course Objectives Worksheet is a tool to help you determine whether the course adequately addresses minimum training objectives set forth in the HMEP Guidelines.

Worksheets exist for each of nine (9) competency areas. You should complete a separate worksheet for each competency area addressed in the course (see Block 4 of the Planning Course Assessment Worksheet).. The competency areas are:

Planning Orientation
Planning Essentials
Planning Specialities
- Commodity Flow Study
- Hazard Analysis
- Capability Assessment
- Planning for Protective Actions
- Plan Implementation and Maintenance
- Facility Planning
- Planning for Public Education

Enter the course title and name of the sponsoring organization on each form you fill out. The training objectives are listed in the left column. You may use either the required or the recommended objectives for your assessment. For each training objective, work horizontally across the page to make three determinations for each objective:

- The course time spent on the objective.
- The methods used to demonstrate student achievement of the objective.
- Whether the objective is adequately addressed in the course.

Course Time Spent On Objective

Estimating the amount of course time spent on each objective provides a useful indicator of the scope or depth of training in each area. More course time implies the opportunity for more in-depth instruction, and vice-versa. Estimating training time can be relatively straightforward for courses whose objectives are structured similarly to the competency organization in the HMEP *Guidelines*. In these situations, you need only analyze a typical course schedule or training agenda to determine how much time is allocated to each objective. Round the estimates to the nearest tenth (0.1) hour. If precise estimates are difficult, break the course down at least to half-hour (0.5) increments.

For courses that do not directly match the objectives or have a mix of origins, estimating training time will require more effort. You must review the course content using the following general procedures:

1. Think through the knowledge, skills, and attitudes (KSAs) needed by a typical student to achieve the training objective.

2. Identify all course content related to these KSAs. (Note: the content may be consolidated or spread out in different sections of the program).

3. Estimate the training time spent on this course content in a typical delivery.

As you conduct the analysis, you may find that some course content is related to more than one training objective. Other course content may not be associated with any of the objectives listed on the worksheet. Use your best judgement to include in your estimate all course time spent on content related to the objective whether or not this time is also reported for other objectives on the form. Relatively broad time estimates are acceptable.

Don't worry if the sum of the hours you estimate for the training objectives is different from the total you reported in Blocks 3 and 7. The figures will be adjusted later to reflect actual contact or classroom hours.

How Is Student Achievement of the Objectives Demonstrated?

Well-designed performance evaluation techniques provide an useful indicator of each student's ability to achieve the training objectives specified for the course. They also provide a powerful tool for assessing whether the course produces the desired results.

Successful student achievement of training objectives can be demonstrated through various means, including performance on written or skills tests, performance in objective-specific activities individually or as a group, and application of what has been learned in large exercises or in post-course exercise (or subsequently on the job). In this section you are asked to identify which technique or techniques are used to evaluate student learning. To make the determination, compare the course content covered in the evaluation mechanism with that related to the training objective. If they match, check the appropriate box on the form.

Is Objective Adequately Addressed? Comment As Needed

The heart of this assessment process lies in determining whether the training objectives identified in the HMTA Guidelines have been adequately addressed in the course. For purposes of this assessment, an objective is considered adequately addressed when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills, and attitudes required to accomplish the objective safely and effectively during hazardous materials response.

Note that this analysis requires you to make a subjective evaluation of the adequacy of the course materials to support effective training delivery. Take into account the course time spent on the objective and the results of

actual student performance evaluations reviewed previously. Other factors might include the scope of the training covered, methodologies used, clarity of presentation, and level of instructor support. Qualitative factors relating to the art and science of adult training should also be considered. Based on your knowledge of the course, determine whether each objective listed on the worksheet is adequately addressed in the instructional materials. If it would be helpful for other training managers, briefly explain your rationale in the space provided for comments. If the course does not cover a specific learning objective, enter "Not addressed" in the appropriate space.

1997 Planning Course Assessment Worksheet

1 Organization Sponsoring Course	2 Individual to Contact — *Contact for further information regarding the course (name, address, phone).*

3 General Course Description

(A) Course Title _____

_____

(B) Edition Number and/or Date _____ (C) Length (hours) _____

(D) Course Purpose or Goal _____

_____

_____

_____

4 Target Audiences, Competencies, Objectives

See instructions. Check each box if yes. If only selected objectives are addressed, describe. Attach appropriate course assessment worksheets. Continue as needed in Section 10: Special Course Characteristics.

(A) Target Audiences

☐ Course is suitable for all potential participants in community haz mat planning who meet prerequisites.

☐ Course is targeted for specific disciplines.

- ☐ Emergency Mgt
- ☐ Fire
- ☐ Law Enforcement
- ☐ EMS
- ☐ Public Works
- ☐ Private Industry Responders and Planners
- ☐ Private Industry Mgt Officials
- ☐ Public Officials
- ☐ Public Community Members
- ☐ Other _____

(B) Competencies and Objectives Addressed

All Objectives	Selected Objectives	Competencies
☐	☐	Planning Orientation
☐	☐	Planning Essentials
		Planning Specialities
☐	☐	Commodity Flow Study
☐	☐	Hazard Analysis
☐	☐	Capability Assessment
☐	☐	Planning for Protective Actions
☐	☐	Plan Implementation and Maintenance
☐	☐	Facility Planning
☐	☐	Planning for Public Education
☐	☐	Other

Describe Selected Objectives *(below or in Sec. 10)*

_____

_____

_____

_____

☐ **Continued in Section 10?**

5 Course Materials

See instructions. Check each box if yes and indicate quantities as requested. Explain as needed in Section 10: Special Course Characteristics.

(A) Instructional Materials

- ☐ Instructor Guide (_____ pages)
- ☐ Student Manual (_____ pages)
- ☐ Handouts (_____ pages)
- ☐ Slides (_____ number)
- ☐ Overhead Transparencies (_____ number)
- ☐ Videotapes (____) number) (_____ total length in minutes)
- ☐ Slide/tapes (____) number) (_____ total length in minutes)
- ☐ Audiotapes (____) number) (_____ total length in minutes)
- ☐ Computer floppy discs (_____ number) (_____ format(s))
- ☐ Computer CDs (_____ number) (_____ format(s))
- ☐ Other _____

(B) Evaluation Materials

- ☐ Student tests
  - ☐ Pretest ☐ End of units ☐ End of course
- ☐ Delivery Assessment Instruments
  - ☐ End of units ☐ End of course
- ☐ Other _____

(C) Refresher Training Materials

- ☐ Refresher training guidance included
- ☐ Refresher training materials included

If yes, please describe in Sec. 10 Special Course Characteristics

(D) Demonstration Equipment & Supplies

- ☐ Are scenario or community hazard mock-ups (such as table top displays) used in course?
- ☐ Are computerized displays (such as plume modeling or mapping systems) used in course?
- ☐ Are copies of large sheet student materials (such as blueprints, construction plans or community maps) used in course?
- ☐ Other *Please describe any specialized equipment or supplies in Section 10 Special Course Characteristics*

☐ **Continued in Section 10?**

6 Course Delivery Formats

See instructions. Check which formats are used to deliver the course. If format varies by module, note which modules apply to each format. Explain as needed in Section 11: Special Course Delivery Considerations..

Check if yes.

- ☐ Independent study use (no instructor)
- ☐ Field delivery run by centralized office
- ☐ Broadcast or televised delivery
- ☐ Local department/ employer delivery
- ☐ Special facility or fixed-site delivery
- ☐ Other _____

If the course is delivered using more than one format, please explain.

_____

_____

_____

☐ ***Continued in Section 10?***

7 Unit or Module Summary

See instructions. Provide module title, length in hours or fraction, and check instructional methodologies employed. Use Section 12: Continuation, if necessary.

Unit / Module Number	Unit / Module Length (in Hours)	Unit / Module Has Potential For Use As Stand-Alone Training Module	Unit / Module Title	Instructional Methodologies Used In Unit/Module										
				Lecture / Discussion	Audiovisual Presentation	Classroom Activities: Individual Student Work	Classroom Activities: Group Work	Table Top or Simulation Lab Exercise	Field or Community Exercise	Self-Study	Computer-Assisted Instruction	Written Testing: Pre-Test, Unit Tests, Post-test	Completion of Post-Course Project	Other

☐ ***Continued in Section 12?***

8 *Materials From Other Programs Used In This Course*

See instructions. Applies to major sources only. Explain as needed in Section 12: Continuation.

Organization	Title of Program or Course Used	Comment

☐ ***Continued in Section 12?***

9 *Factors Affecting Use of Course by Other Organizations*

See instructions. Check if yes. Explain as needed in Section 11: Special Course Delivery Considerations.

- ☐ Do course materials have to be purchased?
- ☐ Do copyright limitations apply to use of the materials?
- ☐ Are there any special instructor skills or experience requirements?
- ☐ Are there any special facility or equipment requirement that would impede another jurisdiction's use of this course?
- ☐ Are there any special competency requirements or prerequisites for students?
- ☐ Does a train-the-trainer program exist?
- ☐ Are optional activities provided for different disciplines (emergency management, fire, EMS, private sector, etc.)?
- ☐ Are course texts available on computer disc?
- ☐ Are course evaluations available for review?
- ☐ Are summaries of student achievement available for review?
- ☐ Do the majority of the scenarios apply to other locales or geographic regions?

☐ ***Continued in Section 11?***

10 *Special Course Characteristics*

See instructions. Identify special or innovative characteristics of the course which would be of interest to other trainers, such as new activity approaches, new videos, unusual content sequencing, etc. If clarifying entries in other sections, identify which sections.

11 *Special Course Delivery Considerations*

See instructions. Identify training issues, special requirements or challenges not identified elsewhere that would affect another organization using or adapting this course. If clarifying entries in other sections, identify which sections.

12 *Continuation*

See instructions. Use this section to continue comments that exceed space allowed in other sections. For each comment, identify section being continued.

Side 4- Planning Course Assessment Worksheet **1997**

1997 Planning Course Objectives Worksheet

Planning Orientation

Course Title

Organization

Training for competencies at the *Planning Orientation* level may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.
An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
ORIENT-1 *Given a description of potential haz mat risks, explain the purpose and benefits of integrated haz mat emergency planning, and describe roles and participants in the emergency management system.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-2 *Given a jurisdiction or facility with the need to develop an integrated haz mat plan, identify legal requirements impacting the planning process and product.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-3 *Given the assignment to conduct haz mate emergency planning, identify the scope and elements of an integrated haz mat emergency plan.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-4 *Given the assignment to conduct hazardous materials emergency planning, identify and describe the major steps, participants, and other resources needed in the planning process.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-5 *Given an assignment to participate in or support integrated hazardous materials planning, develop strategies for promoting planning.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997 Planning Orientation**

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1997 Planning Course Objectives Worksheet

Planning Essentials

Course Title

Organization

Training for competencies at the *Planning Essentials* level may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.
An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
ESSN-1 *Given an assignment ..., describe an appropriate planning strategy and identify team member responsibilities in the process.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-2 *Given a review of pertinent information sources and data collection methods, demonstrate the ability to identify, acquire and summarize background information related to individual organizational and/or functional area(s) of responsibility that will impact the team planning process.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-3 *Given an assignment ..., identify and describe the purpose, benefits, major steps, and participant's role in Hazards Analysis & Capability Assessmt*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-4 *Given an assignment ..., demonstrate the ability to identify, collect, review and interpret the Hazards Analysis & Capability Assessment data.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-5 *Given .... the results of research and input from other planning team members, describe the issues and solutions to be addressed in the plan and identify needed assignments for developing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Planning Essentials (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
ESSN-6 *Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating the Integrated Hazardous Materials Emergency Plan, to address preparedness, response and short term recovery.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-7 *Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating a comprehensive prevention/mitigation section in the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-8 *Given a completed draft hazardous materials plan, demonstrate the ability to participate in the plan review and appraisal process.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-9 *Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for implementing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-10 *Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for evaluating and maintaining the plan.* **END**	Time								Check if objective is adequately addressed. ☐ Comment

Planning Course Objectives Worksheet - **1997 Planning Essentials**

1997 Planning Course Objectives Worksheet

Planning Specialities: Commodity Flow Study

Course Title

Organization

Training for competencies for the planning speciality area *Commodity Flow Study* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
CFS-1 *Given a jurisdiction with the need to develop an integrated haz mat emergency plan, describe the purpose and benefits of conducting a commodity flow study, including applications of the results in planning.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-2 *Given an assignment to conduct a commodity flow study for a jurisdiction, identify major steps in the process.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-3 *Given an assignment to conduct a commodity flow study for a jurisdiction, identify the specific purpose(s) of the study.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-4 *Given the specific purpose(s) of a commodity flow study for a jurisdiction, demonstrate the ability to identify and review existing baseline information appropriate to the study.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-5 *Given the specific purpose(s) and baseline data of a commodity flow study for a jurisdiction, demonstrate the ability to design a field investigation appropriate to the study.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Planning Specialities: Commodity Flow Study (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
CFS-6 *Given an area to be surveyed and the commodity flow study design for a jurisdiction, demonstrate the ability to implement common data collection methods.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-7 *Given hazardous materials transportation data for a jurisdiction, demonstrate the ability to apply appropriate sampling techniques to the collection and interpretation of the data.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-8 *Given hazardous materials transportation data and analyses for a jurisdiction, demonstrate the ability to apply the results in planning.* **END**	Time								Check if objective is adequately addressed. ☐ Comment

Planning Course Objectives Worksheet - **1997**
Planning Specialties: Commodity Flow Study

1997 Planning Course Objectives Worksheet

Planning Specialities: Hazard Analysis

Course Title

Organization

Training for competencies for the planning speciality area *Hazard Analysis* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
HAZAN-1 *Given an assignment to conduct a hazards analysis for a jurisdiction or facility, describe the process to be used for conducting the study.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-2 *Given an assignment to conduct a hazards analysis for a jurisdiction or facility, demonstrate the ability to identify hazards and situations that pose a serious threat in the planning area.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-3 *Given the results of the hazard identification, demonstrate the ability to analyze and map the vulnerability of people, property, business interests, and environments in the planning area.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-4 *Given a hazard identification and vulnerability analysis for a community or facility, demonstrate the ability to assess the risk of injury or damage due to a hazardous materials release in the planning area.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-5 *Given the hazard identification, vulnerability analysis, and risk assessment for a community or facility, demonstrate the ability to prepare a comprehensive hazard analysis report.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997 Planning Specialties: Hazard Analysis**

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1997 Planning Course Objectives Worksheet

Planning Specialities: Capability Assessment

Course Title

Organization

Training for competencies for the planning speciality area *Capability Assessment* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
CAP-1 *Given an assignment to conduct a capability assessment for a jurisdiction or facility, describe the process to be used for conducting the study.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-2 *Given the process to be used for conducting a capability assessment for a jurisdiction or facility, assess the adequacy of existing resources to support preparedness, prevention/ mitigation, response, and short-term recovery activities.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-3 *Given haz mate plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prepare for, respond to, and recover from worst-case incidents identified in the hazard analysis.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-4 *Given haz mat plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prevent or mitigate the effects of identified risks.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-5 *Given the results of the capability assessment analysis, prepare a comprehensive written report.* **END**	Time								Check if objective is adequately addressed. ☐ Comment

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1997 Planning Course Objectives Worksheet

Planning Specialities: Protective Actions

Course Title

Organization

Training for competencies for the planning speciality area *Protective Actions may* be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
EVAC-1 *Given a hazards analysis and capability assessment, demo the ability to develop decision-making criteria for implementing protective actions.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-2 *Given the assignment to plan for protective actions for a jurisdiction or facility, demo the ability to assess existing systems, strategies, and procedures for notifying... ..and informing the public about prot. action decisions.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-3 *Given a hazard analysis and capability assessment, demo the ability to assess existing systems, strategies, and procedures for evacuating populations at risk in a haz mat incident.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-4 *Given a hazards analysis and capability assessment , demo the ability to assess existing systems, strategies, and procedures for impl. in-place sheltering and other protective actions in a hazmat incident.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-5 *Given an assessment of the jurisdiction's or facility's capabilities to implement protective action options in haz mat incidents, demonstrate the ability to develop related emergency plans & procedures.*	Time								Check if objective is adequately addressed. ☐ Comment

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1997 Planning Course Objectives Worksheet

Planning Specialities: Plan Implementation and Maintenance

Course Title

Organization

Training for competencies for the planning speciality area *Plan Implementation and Maintenance* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
PI&M-1 *Given the goals and objectives of the integrated hazardous materials planning process for a jurisdiction or facility, develop a strategy for plan implementation.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-2 *Given a completed integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure proper promulgation and dissemination of the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-3 *Given an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure coordination with multi-jurisdictional planning efforts.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-4 *Given an approved integrated haz mat plan for a jurisdiction or facility, develop strategies to ensure that organizations and personnel are capable of carrying out their assigned responsibilities.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-5 *Given implementation of an approved integrated haz mat plan for a jurisdiction or facility, develop strategies for monitoring changes and trends that impact the plan or planning process.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

1997 Planning Course Objectives Worksheet

Planning Specialities: Plan Implementation and Maintenance (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
PI&M-6 *Given implementation of an approved integrated hazardous materials plan for a jurisdiction or facility, participate in the design and development of an exercise program that is useful for evaluating and updating the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-7 *Given changes and trends that impact the plan or planning process, incident critiques, exercise results, expert opinion, and other information, develop strategies for conducting periodic reviews and updates of the plan.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997**
Planning Specialties: Plan Implementation and Maintenance

1997 Planning Course Objectives Worksheet

Planning Specialities: Facility Planning

Course Title

Organization

Training for competencies for the planning speciality area *Facility Planning* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
FACIL-1 *Given an assignment as a facility planning team member, describe an appropriate planning strategy and team member responsibilities in the process.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-2 *Given an assignment as a facility planning team member, demo the ability to conduct a review of federal, state, and local authorities applicable to the planning process.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-3 *Given an assignment as a facility planning team member, demonstrate the ability to conduct background research appropriate to the planning requirement.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-4 *Given the planning process to be used by the facility, identify the purpose, benefits, methods, expected results, and participant roles in hazards analysis and capability assessment.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-5 *Given the facility's production processes and potential hazards, demonstrate the ability to identify, collect, and interpret hazards analysis and capability assessment data needed for planning.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Planning Specialities: Facility Planning (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
FACIL-6 *Given the results of the facility's hazards analysis and capability assessment, demonstrate the ability to identify issues and solutions to be addressed in the plan, and assignments for developing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-7 *Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating the hazardous materials emergency operations plan, to address preparedness, response and short-term recovery.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-8 *Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating a comprehensive prevention/mitigation section in the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-9 *Given a draft facility hazardous materials plan, participate as assigned in the plan review and appraisal process.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-10 *Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for implementing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-11 *Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for evaluating and maintaining the plan.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997**
Planning Specialties: Facility Planning

1997 Planning Course Objectives Worksheet

Planning Specialities: Planning for Public Education

Course Title

Organization

Training for the portion of the planning speciality area *Planning for Public Education* related to educating the public may be assessed using the recommended objectives displayed below. Additional objectives are being prepared for other portions of this specialty area and will be added at a later time. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
EDUC-1 *Given residency in a specific jurisdiction, identify the purpose, benefits, and components of the jurisdiction's hazardous materials emergency management system.*	Time								Check if objective is adequately addressed. ☐ Comment
EDUC-2 *Given residency in a specific jurisdiction, describe the citizen's role in the jurisdiction's hazardous materials emergency management system.*	Time								Check if objective is adequately addressed. ☐ Comment
EDUC-3 *Given residency in a specific jurisdiction, identify personal actions to promote hazardous materials emergency management.*	Time								Check if objective is adequately addressed. ☐ Comment

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Guidelines for Hazardous Materials TRAINING PROGRAM MANAGEMENT

About the Training Program Management Guidelines

The Training Program Management Guidelines are provided to assist public sector training managers and employers in performing several key tasks in the management of hazardous materials trainining programs. Guidance is provided for the following tasks:

1. Training Needs Assessment: Guidance is provided on developing, maintaining and reporting information regarding levels of responder/planner competencies and on defining and reporting type and volume of training needed within the manager's jurisdiction. Existing regulatory requirements are defined and procedural recommendations are provided. Directions are provided for using a standardized data form for data compilation and reporting.

2. Assessment of Response Courses: Guidance is provided on using the Response Guidelines to assess courses for compliance with OSHA 29 CFR 1910.120 and EPA 311, and compatibility with NFPA 472 and other recommended standards. Guidance is also provided on using the Response Guidelines for standardized description of the substance, scope and utility of courses, to facilitate information sharing and materials exchange with peer training program managers in other jurisdictions. Directions are provided for using standardized course objectives assessment worksheets and a standardized course description and assessment reporting format.

3. Assessment of Planning Courses:
Guidance is provided on using the Planning Guidelines to assess courses for fit with the training competencies identified for the different roles and functions involved in hazardous materials planning. Guidance is also be provided on using the Planning Guidelines for standardized description of the substance, scope and utility of courses, to facilitate information sharing and materials exchange with peer training program managers in other jurisdictions. Directions are provided for using standardized course objectives assessment worksheets and a standardized course description and assessment reporting format.

Hazardous Materials

TRAINING NEEDS ASSESSMENT

The purpose of a hazardous materials training program is to ensure, through training, that persons performing assigned response, planning and prevention responsibilities have the knowledge, skills and abilities to discharge their responsibilities safely and effectively. Other aspects of these guidelines provide support in evaluating existing training materials against established performance standards and in managing the delivery of hazardous materials training. However, providers of training also need to identify the numbers and types of individuals that need to be trained within their juridiction. This information is essential in order determine the scope of the overall training program needed to ensure that all personnel within the jurisdiction will be properly trained to meet the standards and/or achieve a given level of capability. This is the objective of a jurisdictional training needs assessment.

This section explores the rationale for conducting jurisdictional training needs assessments, discusses some of the methodology options and issues associated with jurisdiction-wide needs determination, and provides directions for using a standardized needs assessment worksheet for collecting, organizing and reporting needs assessment data.

What is it?

A training needs assessment is any method of determining what training is needed. It can range from an in-depth analysis of a single specific job task in support of development of a single portion of a training program, to a broad analysis of all hazards faced by an entire jurisdiction in order to determine the tasks and functions that all responders and planners need to be trained to perform. It can range in expense and effort from an "educated guess" of training need made by a group of experts in a single meeting to a jurisdiction-wide survey and statisitical analysis that involves great expense and effort by many people over a period of many months or even years.

For any jurisdiction, the primary purpose of a hazardous materials training needs assessment is to determine how many persons there are within the jurisdiction who are involved in hazardous materials planning, prevention and response and which of those persons need which types and levels of training. The process for determining this information can vary greatly in terms of the amount of effort expended and the breadth of issues considered. Regardless of the approach taken and the complexity of the needs assessment that is produced, a "bottom line" for any jurisdiction-level needs assessment effort is the final data on the training need for that jurisdiction. This "bottom line" should consist of clearly stated data on the numerical size of the training audience and the numbers of employees and other personnel which will need complete or refresher training at each of the different response levels and for all appropriate levels in planning and prevention. This data is essential for jurisdiction-wide training plan development, prioritization of programs, and the strategic allocation of training resources.

Why do it?

A jurisdiction-level training needs assessment is often viewed as a "nice to do" activity and is usually deferred as a lower priority in the face of limited resources for hazardous materials training. However, there are several compelling reasons why such a training needs assessment should be given a high priority in jurisidictions who do not have the needs assessment data presently.

COMPLIANCE WITH FEDERAL REGULATIONS

Under OSHA 29 CFR 1910.120 and EPA 311, the employer must ensure that all responders are trained to minimum competency before responding. State, tribal, territorial and local governments are employers of public sector responders. Data on how many there are, who is trained and who isn't is essential to be able to document that State and local governments are in compliance.

EFFICIENT USE OF RESOURCES

This data is vital for good training plan development. State, tribal, territorial and local training offices must know the scope and nature of the overall training requirement and the specific areas in which current training levels are deficient, in order to determine resources needed and to prioritize training properly to achieve compliance through training with OSHA/EPA requirements.

STRATEGIC PLANNING
Clear data documention of the overall training need within the jurisdiction can be used as the foundation for measurement of progress toward established goals. The data makes possible multi-year training plans and budgets that focus on the impact and comprehensiveness of training. For financial planning and budget purposes, the data is fundamental to justify appropriations and support applications for critically needed supplemental funding and support.

Methodology Considerations

There are two basic approaches usually used to conduct a jurisdiction-level needs assessment, although there are numerous variations possible depending upon differences in State, tribal, territorial and local organizational responsibilities, resources and preferences. The two basic approaches are (1) estimating the need at the State, tribal, or territorial level, and (2) determining the need at the local level and aggregating it at the State, tribal or territorial level.

ESTIMATING NEED AT THE STATE, TRIBAL OR TERRITORIAL LEVEL
This is the least accurate method, but is often used when resources or time prohibit the survey approach discussed below. The challenge is to attempt an unbiased and well-informed estimate. It is recommended that an expert team be formed including good representation of the different jurisidictions within the State, tribe or territory, and representation of the primary disciplines or professions involved in planning and response. All relevant existing data, such as demographic infomation, known turnover percentages, and existing needs estimates should be compiled and provided to the team. The final needs assessment estimate of the team should be a concensus product reflecting the best opinion of all team members. If possible, the resulting estimate should be reviewed by as many local jurisdictions as resources permit.

SURVEYING: USING THE “BOTTOMS UP APPROACH”
This is the most accurate approach to State, tribal or territory needs assessment and has many ancillary benefits beyond accurate data such as hightened local understanding of local training needs. The general process is to develop a needs survey instrument and distribute it to local jurisdictions for development of the information. It is important to have local jurisdiction input into the development of the survey instrument, and to allow sufficient time and resources for local jurisdictions to conduct the needs assessment. The instrument should include directions and a reporting form, and the model form provided in this guidance is offered for optional use. It is recommended that local personnel receive an orientation to the needs assessment work as well as the instrument itself, and that attention be given to consistency to avoid skewed information. It is recommended that attempts be made to establish a “network” with these persons for subsequent updates to maintain the currency and accuracy of the final information. Logistical problems should be anticipated and budgeted for, such as the time needed by State, tribal or territory personnel to follow-up to ensure that all participants complete the work

USING A MIXED APPROACH
Often, it is necessary to use both approaches to determine complete State, tribal and territorial needs assessment data, because local resources and data management systems can vary such that incomplete data will be received from the survey method. In that case, it is recommended that (1) data be collected from major metropolitan areas and local jurisidictions with well-staffed training resources, (2) a sampling be conducted of smaller jurisdictions to determine average data for those groups, and (3) an expert team be assembled at the State, tribe or territory level to extrapolate and “fill in the holes” to reach a final estimate of the need within the jurisdiction.

Issues

DEFINING PLANNING AND PREVENTION TRAINING LEVELS
Defining Planning and Prevention training needs is usually more difficult than defining Response needs, because the roles and responsibilities of public sector employees in these areas are usually not as well defined. It is recommended that survey instruments or expert team work include a draft definition of these

roles for each jurisdiction on which to base an estimate of the training needed to support competency in these roles.This is very important to avoid gaps in training that may result in persons being asked to perform planning and prevention functions (such as preparing local response plans) for which they are not trained or fully competent and upon which the safety of responding personnel may depend. Attention should also be given to the difficulties in determining planning audiences and roles when the planning and SOP work is done as a secondary or occasional duty and the need for training is not immediately evident.

For hazardous materials planning, it is recommended that individual personnel roles be identified at the needs assessment stage in terms of the orientation, essentials, and speciality competencies used in the Planning Guidelines. This will simplify subsequent identification of training need.

VOLUNTEER RESPONDERS

Hard data on number of volunteer responders in the jurisdiction and their existing level of training may be very difficult to acquire because many volunteers may be part time or infrequent participants in response, and volunteer department rosters may include many inactive members. However, State, tribal, territory and local governments are the "employer" of volunteers when they are participating in the response, and therefore are responsible for ensuring competency. Every effort should be made to not underestimate the training need for volunteer responders.

BALANCING RESPONSE PLANS WITH RESPONSE TRAINING NEEDS

Care should be taken to ensure that response training needs describe levels of competency that match actual response plans. For example, the number of persons that are needed to be competent as members of hazardous materials teams should reflect the number and organizational location of hazardous materials response teams in the local and State, tribal and territory emergency response plans. If there is a question about the soundness of the resource requirements described in the plans, some jurisdictions may find the need to undertake a more significant needs assessment for hazardous materials that would include revisiting hazards analyis and/or revisiting response capabilitiy needs. If emergency plans themselves are in question, this may also entail revisiting organizational responsibilities for plan development and jurisdictional models for plan structure and soundness. These issues involve a much more complex effort than is addressed in this guidance, but may have to be considered if it is found that problems in these areas prevent State, tribal, territory and local definition or confirmation of the training need.

Training Needs Information- The Bottom Line Numbers

Regardless of the process used to develop needs assessment data and regardless of the depth or complexity of the information addressed, there are severall basic and simple questions that must be answered if the needs assessment is to support training plan development. In order to determine training resource requirements, training strategies, and compliance with OSHA and EPA requirements, the absolute minimum information that must be determined is the number of people who are not trained or able to perform the function they will be called upon to perform. The basic questions that provide this information are:

(1) How many need to be able to perform each function (such as Incident Commander),
(2) How many are able to perform this function at present, and
(3) How many have not yet been trained or are not yet able to perform this function.

Example

10 firefighters needed to function as incident commander at haz mat emergencies.

4 have already received training or are certified competent at the incident commander level of the guidelines.

6 need to be trained to the incident commander level.

For large jurisdictions such as State training offices with training responsibilities for all response and planning functions, four sets of "bottom line" information are needed:

1. The potential training population. This is the number of persons in the jurisdiction who will potentially be involved in hazardous materials response, planning and prevention work. This information is usually divided by discipline, such as number of fire service potential responders, number of law enforcement potential responders, etc. Anticipated annual turn-over rates are usually included, so the number in the potential training population is usually somewhat larger than the actual number of persons currently employed.

2. How many are needed to be competent at a particular level. This is the number of persons in the jurisdiction that need to be competent to perform each role called for in response, planning, and prevention. For example, one portion of this data would be the number of firefighters needed to be competent at the Technician level. This number is determined by the response plans and response rotocols of the individual jurisdiction, and will vary greatly across jurisdictions. For example, one jurisdiction may use regional hazardous materials response teams and need a smaller number of technican-level responders than a comparably sized jurisdiction with a greater frequency of calls that must maintain local hazardous materials response teams and therefor a greater number of trained technicians.

3. How many have already been trained or certified as competent. This is the number of persons in the jurisdiction that need to be competent and either have already been trained or have been certified as competent by the employer. Records should exist to confirm that the training was received to maintain compliance with OSHA and EPA requirements. If the responder is certified as competent in lieu of training, this must be done by the immediate employer (for example, the Fire Chief or designee on behalf of the local municipal government). Note that OSHA and EPA requirements for annual refresher training apply to all persons already trained or certified as competent. Therefore, this number also becomes the number of persons needing annual refresher training or recertification.

4. How many will need complete training. This is the number of persons in the jurisdiction that need to be competent but are not so at the present time and need to be fully trained.

Example

	Firefighter	Law Enf.	
How many total potential responders (all functions)?	*2,800*	*1,400*	
Anticipated annual turnover?	*280*	*140*	
Total Potential Training Population	*3,080*	*1,540*	
Incident Commander Level			**Total**
How many are needed to be competent at this level?	*190*	*50*	
How many have already been trained or certified as competent?	*35*	*10*	*45*
How many will needed complete training?	*155*	*40*	*195*

Training Need

195 Incident Commander Full Training
45 Incident Commander Refresher Training

Reporting the Training Need

On the following pages are model needs assessment reporting forms. These forms focus on quantifiable summaries of training need- the bottom line numbers- as discussed above. These should be used to report training need with the HMEP grant applications and it is recommended that they also be used as a data gathering form for local submissions to the State, tribal or territory level during the needs assessment process.

The response form follows the above models and uses the standard function definitions of OSHA and NFPA, specifically as elaborated upon in the Response Guidelines portion of this document. Using the above samples, data entry into this form should be self-explanatory.

The planning form follows the above models and uses the function/competency definitions (orientation, essentials, and specialities) presented in the planning guidelines. Translation of existing demographic information (such as the number of LEPC members within a State) into the numbers of persons to be trained to a given competency requires judgement and decision-making regarding the sophisitication of planning roles to be performed. This will vary from jurisdiction to jurisdiction, depending upon the organization of planning responsibilities. For example, one State might prefer that all commodity flow studies in the State be done by State staff, so all local planning team members might require essentials-level training but only selected state personnel would need speciality-level training in doing a commodity flow study. See the planning curriculum guidelines for more thorough background information on defining these roles and responsibilities.

RESPONSE Training Needs Worksheet

		Fire	Law	EMS	Other	TOTAL Full Training Refresh
	How many responders presently?					
	Anticipated annual turnover?					
	Total Potential Training Population					
1st Resp. Awareness	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
1st Resp. Operations	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Haz Mat Technician	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Incident Commander	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
HM Branch Officer	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Safety Officer	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Haz Mat Specialist	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Specialist Employee	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
EMS Level 1	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
EMS Level 2	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Hospital ER Empl.	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					

PLANNING Training Needs Worksheet

		Local Planning Team Members	State/ Tribal/Terr. Planning Personnel	OTHER Public Sector	OTHER Private Sector	TOTAL ■ Full Training ■ Refresh
	How many presently?					
	Anticipated annual turnover?					
	Total Potential Training Population					
Planning Orientation	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Essentials	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Commodity Flow Study**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Hazard Analysis**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Capability Assessment**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Protective Actions**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Plan Implementation & Maintenance**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Facility Planning**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					
Planning Speciality **Public Education**	How many needed to be competent at this level?					
	How many will need complete training?					
	How many already trained or certified as competent?					

Hazardous Materials
Response Course Assessment

Response Course Assessment DIRECTIONS

These instructions describe the methodology for assessing hazardous materials response courses. Section 1, **General Information**, explains the purpose and nature of the assessment process. Section 2, **Performing a Course Assessment**, identifies basic steps for completing the assessment instruments. Section 3, **Specific Instructions**, provides block-by-block directions for filling out the instruments. A completed sample is attached, showing the assessment of the National Fire Academy course *Initial Response to Hazardous Materials Incidents: Basic Concepts*.

Every effort has been made to keep these instruments and instructions as simple and useful as possible. However, assessing adult training activities inherently involves some time and work.

1. GENERAL INFORMATION

Purpose of the Response Course Assessment Worksheet

The Response Course Assessment Worksheets are designed to (1) gather descriptive information about individual hazardous materials training activities in a standardized format, and (2) facilitate comparison of course content with the mandated and recommended training requirements identified in the Hazardous Materials Emergency Preparedness (HMEP) grant program document *Guidelines for Public Sector Hazardous Materials Training (Guidelines)*. The data can be used to:

- Evaluate the scope of existing courses relative to Federal and other national standards and guidelines.
- Disseminate information to state and local training managers nationwide about existing courses.
- Help training agencies assess the usefulness of existing courses for their own needs.

Why Assess Response Courses?

State and local agencies with hazardous materials training responsibilities can use the results of the assessment process for the purpose of:

1. Certifying compliance of training with OSHA 29 CFR 1910.120 and EPA 311, and with the HMEP grant program curriculum Guidelines.
2. Verifying compatibility of training with NFPA 472, NFPA 473, and other training recommendations or requirements.
3. Analyzing and revising the current training plan.
4. Developing new courses or revising current ones to address unmet training needs.

5. Assessing whether to adopt or adapt an outside course for use within the organization or jurisdiction.

6. Communicating characteristics of existing courses to peer training managers in other organizations and jurisdictions.

7. Evaluating the capabilities of currently trained State and local response personnel.

8. Documenting and explaining the scope of training activities to outside decision-makers and the public.

The training needs of individual agencies or jurisdictions may differ from those defined here. Many factors that affect the quality of training are outside the scope of this assessment process. Training managers may supplement the results of this assessment process through peer instructor evaluation of deliveries, professional review of course materials, in-depth student and instructor interviews, student testing, and other forms of expert opinion.

Who Should Complete a Response Course Assessment?

A course assessment should be conducted by any organization with hazardous materials response training requirements.

All courses used in the HMEP grant program should be assessed. This includes Federal, State, tribal, and Protectorate, national professional association, and private sector courses used by grantees in their public sector training curriculums. Each course should be formally assessed by only one sponsoring organization.

HMEP grantees are responsible for assessing those courses in their curriculums (1) which they have developed entirely or modified for their specific use and (2) which are provided by private sector sources and contractors (other than national associations) and are used by the HMEP grantees use as part of their public sector curriculum. HMEP grantees are not responsible for assessing Federal, national association courses, or courses from other HMEP grantee curriculums. Federal and national association providers of training will be asked to provide assessment of their respective programs which are in use by HMTA grantees.

Assessment Evaluator Qualifications

It is recommended that assessment evaluators have the following minimum qualifications:

- A thorough understanding of the course purpose, training objectives, content, and instructional methodologies.

- Be familiar with the course delivery requirements, related administrative considerations, and student evaluation results.

- Have in-depth knowledge of all target training audiences, including their response roles, job tasks, and required competencies.

- Have knowledge of hazardous materials response operations, applicable regulations and standards, including those promulgated by OSHA, EPA, and NFPA.

- Have experience and credentials in applying the principles and techniques of adult education to emergency services audiences.

Given the nature of the assessment process, sponsoring organizations may wish to consider using a workgroup approach, particularly for major courses. Assessment evaluators may include members of the course design and development team; experienced instructors, training program administrators, and course managers; qualified members of the training audience; and other hazardous materials experts as deemed appropriate.

2. PERFORMING A RESPONSE COURSE ASSESSMENT

Initial Considerations

Before filling out the assessment instruments, participants should understand the purpose and requirements of the assessment process, and be familiar with the HMEP *Guidelines*.

The first step is to determine the desired depth of the analysis. Generally, one set of assessment instruments is completed for each course. If a course is comprised of major modules or sections that could serve as stand-alone courses in themselves it may be desirable to complete a separate set of instruments for each of those modules or sections of the course.

To decide the appropriate level of assessment consider the possible ways other emergency services organizations may use the training, the information, and decision-making needs of peer training managers. If, in your judgement, a significant number of agencies would benefit by more detailed information, complete one set of instruments for each major module or section of the course. Otherwise, fill out one set of instruments for the entire course.

General Steps in the Process

You are now ready to begin the course assessment. Following the general steps listed below will help you prepare the forms quickly and accurately.

Step 1: Review Course Training Materials — Gather and review all course instructional materials. These may include plans of instruction, content outlines, student manuals, instructor guides, audiovisual presentations (films, videotapes, slide-tapes, etc.), job aids, reference materials, and handout materials.

Step 2: Review Course Delivery Data — Gather and review materials that describe the effectiveness of previous course deliveries. These may include data on course offerings and participants, student and instructor training evaluations, student test summaries, and long-term performance evaluation results. You may interview or survey persons knowledgeable about course deliveries.

Step 3: Gather Related Documents — Obtain copies of other documents that may be useful in the course assessment process. Examples might include related federal legislation and regulations, copies of NFPA 472 and 473, source materials used in the development of the course, refresher training and train-the-trainer materials, course promotional materials, technical documents referenced in the course.

Step 4: Select Appropriate Instruments — Each course assessment requires filling out two separate instruments:

- **Response Course Assessment Worksheet** describes the course and related delivery considerations. The basic format of the instrument is the same for all training activities assessed under this process. Copies of the instrument can be made from the master copy accompanying these instructions.

- **Response Course Objectives Worksheet(s)** assesses course content relative to the HMEP *Guidelines*, and identifies the required and recommended training objectives for all competency areas addressed in the course. Separate Course Objectives Worksheets are available for the following competency areas:

  First Responder Awareness
  First Responder Operations
  Hazardous Materials Technician
  Incident Commander
  Hazardous Materials Branch Chief (NFPA)
  Safety Officer at Hazardous Materials Incidents (OSHA)
  Hazardous Materials Branch Safety Officer (NFPA)
  Specilalist Employee (OSHA)
  Private Sector Specialist Employee C (NFPA)
  Private Sector Specialist Employee B (NFPA)
  Private Sector Specialist Employee A (NFPA)
  Hazardous Materials Specialist (OSHA)
  Technician with a Tank Car Speciality (NFPA)
  Technician with a Cargo Tank Speciality (NFPA)
  Technician with an Intermodal Tank Speciality (NFPA)
  Emergency Medical Service Level 1 Responder
  Emergency Medical Service Level 2 Responder
  Hospital Emergency Room Personnel

You should complete a separate Course Objectives Worksheet for each competency area addressed in the course. Make copies of the appropriate worksheets from the master copies accompanying these instructions. (More information is provided under Specific Instructions, Response Course Assessment Worksheet.)

Step 5: Fill in the Instruments — The block-by-block instructions for the instruments begin below. If more space is needed for your answers, use Section 12, Continuation, and attach separate sheets, as needed.

For most courses, the process can take approximately one to two hours per day of training depending on the complexity of the course, the number of people participating, their familiarity with the instructional materials, the desired workgroup process, the course's structural relationship to OSHA/EPA and NFPA standards, and other factors.

Step 6: Using the Completed Instruments — The completed instruments should be filed as documentation of your organization's finished HMTA self-assessment of response courses. They can also be used to review your curriculum for completeness and to support dialogue with other training systems regarding your programs. For submission of the information into the HMTA Course Assessment Project, please use the enclosed return envelope or equivalent and send copies of the completed Response Course Assessment Worksheet with Course Objectives Worksheets attached for each course assessed to:

William Lewis
HMTA Course Assessment Project
National Emergency Training Center, FEMA
16825 South Seton Avenue
Emmitsburg, MD 21727

If you have any questions or would like assistance in completing your course assessment, call William Lewis (301) 447-1009, or Jennifer Krietz (301) 447-1585, or FAX (301) 447-1588.

3. SPECIFIC INSTRUCTIONS

This section provides detailed instructions for filling out the Response Course Assessment Worksheet and the Course Objectives Worksheet. A completed sample of the instruments is attached. Please read these directions carefully as you proceed.

Response Course Assessment Worksheet

Block 1: Organization Sponsoring Course

Enter the name and address of the Sponsoring Organization (the agency that has primary responsibility for the design and content of the course, and which maintains associated rights) in Block 1. Include subdivision titles, as appropriate.

Block 2: Individual to Contact

Enter the name, mailing address, and phone number of a person assigned to serve as a contact for federal agencies, State and local training managers, and others interested in learning more about the course. This person should be knowledgeable about the course and able to answer questions about the assessment process and results.

Block 3: General Course Description

A. Course Title — Enter the complete formal title of the course, including subtitles.

B. Edition Number and/or Date — Enter the official course number or edition/revision number and date which is used to identify the course. This number typically appears on the cover or title page of the instructional materials.

The identifying number should refer to the entire course, not separate elements such as the student manual, instructor guide, or videotapes. Do not list the International Standard Book Number (ISBN), Library of Congress Catalog Card Number, or other publishing reference number. For published works, enter the most recent publication date, but not the date of later reprintings (if any).

C. Length (hours) — Enter the length or duration of classroom hours per course. Course length includes all educational activities that are part of the course.

D. Course Purpose or Goal — The course purpose or goal is a brief statement (one to three sentences) that broadly defines the desired outcome(s) of the total educational experience, and attempts to clarify the competencies or capabilities that students should possess after having satisfactorily completed all course requirements. This goal is met when all training objectives identified for the course have been achieved. As a rule of thumb, consider how best to complete the sentence “Having successfully completed the course, students will be able to....”

Block 4: Target Audiences, Competencies and Objectives

A. Target Audiences — For purposes of this assessment, target audiences are broadly defined as groups with similar organizational missions in hazardous materials incident response. These include the emergency services (fire, law enforcement, and emergency medical), public works, and other functional areas of State and local responsibility.

Identify the target audience categories for which this course is suitable by checking the appropriate boxes on the form. List other audiences that would benefit by this training. Examples might include elected/appointed officials, emergency management, public health, environmental agencies, and medical facilities.

B. Competencies and Objectives Addressed in Course — Competency areas are defined as response roles that public sector employees may be required to perform during a hazardous materials incident. The seven competency areas listed on the assessment form follow the categories identified in OSHA 1910.120, EPA 311 and the HMEP *Guidelines*.

An individual course may address parts of a competency area, a total competency area, or multiple competency areas. To determine which competency area(s) your course addresses, you must first compare the course content with the training objectives identified for each area. The objectives are listed in the HMEP *Guidelines* and are duplicated on the respective Course Objectives Worksheets.

After determining which competency areas your course addresses, check the appropriate boxes on the form. If the course addresses all the objectives in the competency area check "All"; if the course addresses only a portion of them check "Selected". You may need to check one or more competency areas. If you check "Selected" for any competency area, briefly explain the scope of the course in the space provided on the form. If more space is needed, continue in section 10: Special Course Characteristics. (Note: the description you provide should expand on and clarify the course purpose or goal statement entered in Block 3.)

Reminder: Fill out Course Objectives Worksheets for each competency area you check here, whether "All" or "Selected."

Block 5: Course Materials

A. Instructional Materials — Check the appropriate boxes to indicate which of the listed types of instructional materials are used in delivering the course. Enter the correct quantities for each type of material, as specified on the form. If separate refresher training materials are available, please describe them in Section 10: Special Course Characteristics. List other types of instructional materials used in the course (e.g., job aids, reference documents, films, computer software) in the space provided, continuing as necessary in Section 10: Special Course Characteristics.

B. Training Evaluation Materials — Check the appropriate boxes to indicate which of the listed types of evaluation materials are used in the course. If evaluation approaches other than student tests or instructor/student assessments are used, describe fully in Section 10: Special Course Characteristics.

C. Refresher Training Materials— Check the appropriate boxes to indicate whether refresher training guidance and/or materials are included in the course package. Describe focus, scope and competency priorities of any refresher training components in Section 10: Special Course Characteristics

D. Physical Skills Laboratory & Demonstration Equipment and Supplies — If special equipment or supplies are used in the delivery of the course, check the appropriate box(es) and explain briefly in Section 10: Special Course Characteristics. These materials include any props, tools, supplies, apparatus, equipment, or instructional aids that would not be readily available in a typical emergency services training environment. Do not include standard response equipment (turnout gear, firefighting tools, etc.) or common training supplies (media projectors, flipcharts, photocopying machines, etc.).

Block 6: Course Delivery Formats

Courses are designed for use in certain settings or environments, depending on the resources required for delivery, nature of the instruction, size and location of the target audience, cost considerations, and many other factors. Typical formats for emergency services training include:

- Independent student use — self-contained educational materials designed for use by individual target audience members without ongoing instructor support. (Note: this category includes computer-assisted instruction and interactive videodisc presentations).

- Local department/employer delivery — training that can be delivered by public sector organizations with the resources and capabilities commonly available at the local level.

- Field delivery run by centralized office — training delivered locally, but administered and perhaps staffed by a centralized facility, such as the Emergency Management Institute, State Fire Marshal's office, regional training academy, or private university.

- Special facility or fixed-site delivery — training that must be conducted on-site at a specific facility because it employs large, non-transportable equipment (such as large piping and valve systems, specialized simulation structures, etc.) or because other instructional considerations (such as co-locating with another program) restrict delivery of the course to the specific site.

- Broadcast or televised delivery — training designed for delivery to groups of students via teleconference, broadcast television, closed-circuit television, radio, or other similar instructional media.

Check the box for the delivery format that applies to the course. In most cases, only one delivery format should be marked. Sometimes, however, multiple delivery formats may be possible for the same course (e.g., local department/employer delivery or field delivery run by a centralized office). In other cases, different modules may be delivered using different instructional formats. If more than one delivery format applies, check the appropriate boxes and explain briefly.

Block 7: Unit or Module Summary

Use Block 7 to list the major modules, units, chapters, or sections of the course. Include the unit/module number, planned or expected duration in hours (see the instructions for Block 3), and title. If the sum of the hours shown here does not match the total for the course reported in Block 3, explain in Section 10, Special Course Characteristics.

For each unit/module, indicate whether it could serve in other curriculums as a stand-alone module. The purpose of this information is to assist other training managers in determining whether the material could be incorporated into their programs. In general, a unit has potential as a stand-alone training module if (1) there is closure within the unit of student learning including demonstration of mastery of the material, and (2) if the material is not dependent for coherency or learning upon the unique sequence of content in the preceding and following units of the course.

In addition, identify the types of instructional methodologies used in each unit/module by checking one or more of the boxes on the form. Check other methodologies (e.g., role play, interactive videodisc, behavior modeling, etc.) in the space provided.

Block 8: Materials From Other Programs Used in Course Development

Source materials are training programs, job task analyses, research reports, technical manuals, etc. that are used in developing the course. By identifying these source materials it will help peer training managers and others to:

- Understand the course based on familiarity with the source materials.
- Identify similarities and differences among training activities and programs.
- Evaluate appropriate applications of the course.

In this section of the form, you are asked to identify major source materials used in developing the course. Include only those materials that were used extensively or that contributed significantly to the final form and content of the course. Do not list others whose impact was less important, even if they were researched as part of the course design and development process. For each major source material, fill in the title and the

name of the organization that developed it. Then list the module/unit numbers (from Block 7) of the course that were strongly influenced by the source material. If the source material applies to the entire course, write "all." Explain as necessary in Section 12: Continuation.

Block 9: Factors Affecting Use of Course By Other Organizations

Many factors must be weighed when considering whether to adopt or adapt an existing course: associated costs, delivery requirements, compatibility with mission and audiences, ability to modify, available support services, ease of use. This section of the assessment form includes a checklist of these factors to help other training managers make decisions about using the course for their own needs.

Review the questions and check the appropriate box for each one that you answer affirmatively. Then, using this checklist as a "mind jogger," write in Section 11: Special Delivery Characteristics a brief summary of all major factors that could affect use of the course by other agencies. In your narrative, try to address typical decision-making needs and obstacles faced by training managers in emergency services organizations when developing, adapting, or conducting training. If more space is needed, use Section 12, Continuation.

Blocks 10-12

Use Blocks 10-12 to complete your response to other sections of the form (see the instructions for Blocks 4 through 9). Keep your responses as clear as possible.

Response Course Objectives Worksheets

The Response Course Objectives Worksheet is a tool to help you determine whether the course adequately addresses minimum training objectives set forth in the HMTA Guidelines. Required and recommended objectives are identified. The required objectives are based on OSHA/EPA regulations; recommended objectives were developed using NFPA 472 and 473 standards.

Worksheets exist for each of eighteen (18) competency areas. You should complete a separate worksheet for each competency area addressed in the course (see Block 4 of the Response Course Assessment Worksheet).. The competency areas are:

First Responder Awareness
First Responder Operations
Hazardous Materials Technician
Incident Commander
Hazardous Materials Branch Chief (NFPA)
Safety Officer at Hazardous Materials Incidents (OSHA)
Hazardous Materials Branch Safety Officer (NFPA)
Specilalist Employee (OSHA)
Private Sector Specialist Employee C (NFPA)
Private Sector Specialist Employee B (NFPA)
Private Sector Specialist Employee A (NFPA)
Hazardous Materials Specialist (OSHA)
Technician with a Tank Car Speciality (NFPA)
Technician with a Cargo Tank Speciality (NFPA)
Technician with an Intermodal Tank Speciality (NFPA)
Emergency Medical Service Level 1 Responder
Emergency Medical Service Level 2 Responder
Hospital Emergency Room Personnel

Enter the course title and name of the sponsoring organization on each form you fill out. The training objectives are listed in the left column. You may use either the required or the recommended objectives for your assessment. For each training objective, work horizontally across the page to make three determinations for each objective:

- The course time spent on the objective.
- The methods used to demonstrate student achievement of the objective.
- Whether the objective is adequately addressed in the course.

Course Time Spent On Objective

Estimating the amount of course time spent on each objective provides a useful indicator of the scope or depth of training in each area. More course time implies the opportunity for more in-depth instruction, and vice-versa. Estimating training time can be relatively straightforward for courses that are structured according to the OSHA/EPA or NFPA standards. In these situations, you need only analyze a typical course schedule or training agenda to determine how much time is allocated to each objective. Round the estimates to the nearest tenth (0.1) hour. If precise estimates are difficult, break the course down at least to half-hour (0.5) increments.

For courses that do not directly match the objectives or have a mix of origins, estimating training time will require more effort. You must review the course content using the following general procedures:

1. Think through the knowledge, skills, and attitudes (KSAs) needed by a typical student to achieve the training objective.
2. Identify all course content related to these KSAs. (Note: the content may be consolidated or spread out in different sections of the program).
3. Estimate the training time spent on this course content in a typical delivery.

As you conduct the analysis, you may find that some course content is related to more than one training objective. Other course content may not be associated with any of the objectives listed on the worksheet. Use your best judgement to include in your estimate all course time spent on content related to the objective whether or not this time is also reported for other objectives on the form. Relatively broad time estimates are acceptable.

Don't worry if the sum of the hours you estimate for the training objectives is different from the total you reported in Blocks 3 and 7. The figures will be adjusted later to reflect actual contact or classroom hours.

How Is Student Achievement of the Objectives Demonstrated?

Well-designed performance evaluation techniques provide an useful indicator of each student's ability to achieve the training objectives specified for the course. They also provide a powerful tool for assessing whether the course produces the desired results.

Successful student achievement of training objectives can be demonstrated through various means, including performance on written or skills tests, performance in objective-specific activities individually or as a group, or application of what has been learned in large exercises (or subsequently on the job). In this section you are asked to identify which technique or techniques are used to evaluate student learning. To make the determination, compare the course content covered in the evaluation mechanism with that related to the training objective. If they match, check the appropriate box on the form.

Is Objective Adequately Addressed? Comment As Needed

The heart of this assessment process lies in determining whether the training objectives identified in the HMTA Guidelines have been adequately addressed in the course. For purposes of this assessment, an objective is considered adequately addressed when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills, and attitudes required to accomplish the objective safely and effectively during hazardous materials response.

Note that this analysis requires you to make a subjective evaluation of the adequacy of the course materials to support effective training delivery. Take into account the course time spent on the objective and the results of actual student performance evaluations reviewed previously. Other factors might include the scope of the training covered, methodologies used, clarity of presentation, and level of instructor support. Qualitative factors relating to the art and science of adult training should also be considered. Based on your knowledge of the course, determine whether each objective listed on the worksheet is adequately addressed in the instructional materials. If it would be helpful for other training managers, briefly explain your rationale in the space provided for comments. If the course does not cover a specific learning objective, enter “Not addressed” in the appropriate space.

1997 Response Course Assessment Worksheet

1 Organization Sponsoring Course

National Fire Academy
Federal Emergency Management Agency
16825 South Seton Avenue
Emmitsburg, Maryland 21727

2 Individual to Contact

Contact for further information regarding the course (name, address, phone).

Rob Weiderhold, Hazardous Materials Program Chair
National Fire Academy
(same address)
(301) 447-1000

3 General Course Description

(A) Course Title *Initial Response to Hazardous Materials Incidents*
Course 1: Basic Concepts (IHRMI-BC)

(B) Edition Number and/or Date *August, 1992* (C) Length (hours) *12*

(D) Course Purpose or Goal *The course is designed to address the basic training needs of all first responders, covering basic concepts and techniques of first response and emphasizing the requirements of OSHA 29 CFR 1910.120. The course is the first part of a two course series addressing awareness and operations competencies.*

4 Target Audiences, Competencies, Objectives

See instructions. Check each box if yes. If only selected objectives are addressed, describe. Attach appropriate course assessment worksheets. Continue as needed in Section 10: Special Course Characteristics.

(A) Target Audiences

[X] Course is suitable for all potential responders meeting competency prerequisites.

[ ] Course is targeted for specific disciplines.

- [ ] Fire
- [ ] Law Enforcement
- [ ] EMS
- [ ] Hospital
- [ ] Public Works
- [ ] Private Sector Employees
- [ ] Other _____

(B) Competencies and Objectives Addressed in Course

All Objectives	Selected Objectives	Competencies
[X]	[ ]	First Responder Awareness
[ ]	[X]	First Responder Operations
[ ]	[ ]	Hazardous Materials Technician
[ ]	[ ]	Incident Commander
[ ]	[ ]	Hazardous Materials Branch Chief
[ ]	[ ]	Safety Officer at Hazardous Materials Incidents
[ ]	[ ]	Hazardous Materials Branch Safety Officer
[ ]	[ ]	Specialist Employee
[ ]	[ ]	Private Sector Offsite Specialist Employee B
[ ]	[ ]	Private Sector Offsite Specialist Employee C
[ ]	[ ]	Hazardous Materials Specialist
[ ]	[ ]	Private Sector Offsite Specialist Employee A
[ ]	[ ]	Technician with a Tank Car Speciality
[ ]	[ ]	Technician with a Cargo Tank Speciality
[ ]	[ ]	Technician with an Intermodal Tank Speciality
[ ]	[ ]	Emergency Medical Service Level 1
[ ]	[ ]	Emergency Medical Service Level 2
[ ]	[ ]	Hospital Emergency Room Personnel
[ ]	[ ]	Other

Describe Selected Objectives *(below or in Sec. 10)*

The course exceeds current standards for Awareness, progressing into Operations. (See course assessment worksheets for details).

[X] **Continued in Section 10?**

5 Course Materials

See instructions. Check each box if yes and indicate quantities as requested. Explain as needed in Section 10: Special Course Characteristics.

(A) Instructional Materials

- [X] Instructor Guide (*266* pages)
- [X] Student Manual (*239* pages)
- [X] Handouts (*10* pages)
- [X] Slides (*347* number)
- [ ] Overhead Transparencies (_____ number)
- [X] Videotapes (*3*) number) (*28* total length in minutes)
- [ ] Slide/tapes (____) number) (_____ total length in minutes)
- [ ] Audiotapes (____) number) (_____ total length in minutes)
- [ ] Computer floppy discs (_____ number) (_____ format(s))
- [ ] Computer CDs (_____ number) (_____ format(s))
- [X] Other *DOT Emergency Response Guide*

(B) Evaluation Materials

- [X] Student tests
  - [X] Pretest [ ] End of units [X] End of course
- [ ] Delivery Assessment Instruments
  - [ ] End of units [ ] End of course
- [ ] Other _____

(C) Refresher Training Materials

- [ ] Refresher training guidance included
- [ ] Refresher training materials included

If yes, please describe in Sec. 10 Special Course Characteristics

(D) Physical Skills Laboratory and Demonstration Equipment & Supplies

- [ ] Are standard issue responder equipment and protective gear used in course?
- [ ] Are specialized hazardous materials response equipment and protective gear used in course?
- [ ] Are incident mock-ups, scenario equipment and props use in course (drums, tanks, valve assemblies, etc.)?

Please describe the use of any specialized equipment or supplies in Section 10 Special Course Characteristics

[X] **Continued in Section 10?**

Sample Completed Response Course Assessment

6 *Course Delivery Formats*

See instructions. Check which formats are used to deliver the course. If format varies by module, note which modules apply to each format. Explain as needed in Section 11: Special Course Delivery Considerations..

Check if yes.

- [ ] Independent study use (no instructor)
- [X] Field delivery run by centralized office
- [ ] Broadcast or televised delivery
- [X] Local department/ employer delivery
- [X] Special facility or fixed-site delivery
- [ ] Other _____

If the course is delivered using more than one format, please explain.

The course is designed for easy use in field or local department, and may be used at centralized Academy.

[X] ***Continued in Section 10?***

7 *Unit or Module Summary*

See instructions. Provide module title, length in hours or fraction, and check instructional methodologies employed. Use Section 12: Continuation, if necessary.

Unit / Module Number	Unit / Module Length (in Hours)	Unit / Module Has Potential For Use As Stand-Alone Training Module	Unit / Module Title	Instructional Methodologies Used In Unit/Module: Lecture / Discussion	Skills Demonstration / Performance Modeling	Audiovisual Presentation	Classroom Activities: Individual Student Work	Classroom Activities: Group and/or Table Top Work	Physical Skills Laboratory: Hands-On Student Work	Field Exercises or Drills	Self-Study	Computer-Assisted Instruction	Written Testing: Pre-Test, Unit Tests, Posttest	Other
1	1		*Introduction*	X		X	X							
2	1		*Regulations and Standards*	X										
3	1		*Personal Safety*	X		X		X						
4	1		*Toxicology*	X			X							
5	1.75		*Introduction to Recognition and Identification*	X			X	X						
6	2.2	X	*Site Management and Scene Set-up*	X		X	X	X						
7	.66		*Personal Protective Equipment*	X			X							
8	1		*Decontamination*	X										
9	.5		*Resources*	X			X							
10	1.5		*Course Wrap-up*	X				X						X

[ ] ***Continued in Section 12?***

Side 2 - Response Course Assessment Worksheet **1997**

8 Materials From Other Programs Used In This Course

See instructions. Applies to major sources only. Explain as needed in Section 12: Continuation.

Organization	Title of Program or Course Used	Comment
	None.	*Original development using task analysis based on OSHA 29 CFR 1910.120 and NFPA 472.*
		Some scenarios adapted from other NFA programs.

☐ **Continued in Section 12?**

9 Factors Affecting Use of Course by Other Organizations

See instructions. Check if yes. Explain as needed in Section 11: Special Course Delivery Considerations.

- [X] Do course materials have to be purchased?
- [ ] Do copyright limitations apply to use of the materials?
- [ ] Are there any special instructor skills or experience requirements?
- [ ] Are there any special facility or equipment requirement that would impede another jurisdiction's use of this course?
- [ ] Are there any special competency requirements or prerequisites for students?
- [X] Does a train-the-trainer program exist?
- [X] Are optional activities provided for different disciplines (fire, public works, EMS, etc.)?
- [ ] Are course texts available on computer disc?
- [ ] Are course evaluations available for review?
- [ ] Are summaries of student achievement available for review?
- [X] Do the majority of the scenarios apply to other locales or geographic regions?

[X] **Continued in Section 11?**

10 Special Course Characteristics

See instructions. Identify special or innovative characteristics of the course which would be of interest to other trainers, such as new activity approaches, new videos, unusual content sequencing, etc. If clarifying entries in other sections, identify which sections.

4. The course can be presented in conjunction with Course II: Concept Implementation for more detail and greater depth, covering other competencies of First Responder Operations. Training emphasis is on fire service but is appropriate for other audiences.

5. A 10-question pretest and 25-question posttest (multiple choice) are included. The DOT Emergency Response Guide is used in activities; one copy per student is ideal, although 5-6 copies is adequate for small group work. Slides are used extensively to support lectures and activities.

The course provides a broad overview and introduction to haz mat response concepts, functions and roles. Many individual and small group activities allow students to apply learning to realistic haz mat response situations. An emphasis is placed on defensive operations and personal safety.

All Awareness objectives are adequately met, and most Operations objectives are met.

1997 Response Course Assessment Worksheet - **Side 3**

Sample Completed Response Course Assessment

11 *Special Course Delivery Considerations*

See instructions. Identify training issues, special requirements or challenges not identified elsewhere that would affect another organization using or adapting this course. If clarifying entries in other sections, identify which sections.

6. *The course is designed as a standard National Fire Academy two-day field course for use by Fire departments and other response agencies at the State and local level. In-depth instructor support (lesson plan, slide references, activity instructions, sample discussion questions, etc.) is included. The student manual can be used for self-study after class.*

9. *All course materials (except for the DOT Emergency Response Guide) can be purchased from the National Audiovisual Center for minimal costs. The materials are in the public domain. No special instructor skills or facility/equipment requirements apply. The course assumes no previous haz mat response training for students. A train-the-trainer program was conducted at the National Fire Academy in 1992; no further offerings are currently planned. Many States and metros have conducted further train-the-trainer programs.*

The course activities utilize a range of scenarios that are representative of incidents in various locales and geographic areas. Fire service and EMS functions are emphasized, but the roles of other responders are addressed. Jurisdictions could substitute local scenarios/slides, if desired. The posttest is designed to test the student's grasp of the course content. The State or local agency presenting the course must determine if the test instrument is valid for determining competency within the jurisdiction.

12 *Continuation*

See instructions. Use this section to continue comments that exceed space allowed in other sections. For each comment, identify section being continued.

Side 4- Response Course Assessment Worksheet **1997**

***1997** Response Course Objectives Worksheet*

First Responder Awareness: Required Objectives

Course Title: *Initial Response to Hazardous Materials Incidents: Basic Concepts*

Organization: *National Fire Academy*

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(i), and are abbreviated below as OSHA AWARE-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA AWARE-A *Define hazardous substances and identify risks at hazardous materials incidents.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Definitions, incident levels, zones, hazard types, toxicity, other areas covered.*
OSHA AWARE-B *Identify potential outcomes at hazardous materials incidents.*	Time *n/a*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Many concepts and activities relate to haz mat operations, outcomes throughout course.*
OSHA AWARE-C *Recognize presence of hazardous materials at incidents.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Markings, placards, container types, and other clues are covered.*
OSHA AWARE-D *Identify hazardous substances present at incidents.*	Time *3.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Identification procedures and resources (e.g. ERG, MSDS) are covered.*
OSHA AWARE-E *Understand role of first responder at awareness level in emergency response plan.*	Time *1.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Response roles, planning requirements, SOP's, personal safety, other areas are covered.*
OSHA AWARE-F *Given haz mat incident, determine additional resources needed & notify comm, center.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. *X* Comment: *Resources and notification requirements are covered and applied in activities.*

***1997** Response Course Objectives Worksheet*

First Responder Awareness: Recommended Objectives

Course Title: *Initial Response to Hazardous Materials Incidents: Basic Concepts*

Organization: *National Fire Academy*

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 2: Competencies for the First Responder at the Awareness Level. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
AWARE-1 **NFPA 2-1.3** *Understand role of first responder at the awareness level.*	Time *3.75*	*X*	*X*		*X*				Check if objective is adequately addressed. ☐ Comment: *Personal safety, toxicology, and basic recognition and identification are covered.*
AWARE-2 **NFPA 2-2.1** *Detect the presence of hazardous materials at incidents.*	Time *.66*	*X*			*X*				Check if objective is adequately addressed. ☐ Comment: *Types, protective capabilities, and limitations of PPE's are covered.*
AWARE-3 **NFPA 2-2.2** *Survey incidents from safe location and identify the hazardous materials present.*	Time *n/a*								Check if objective is adequately addressed. ☒ Comment: *Basic concepts, terminology, regulations and standards are covered throughout course.*
AWARE-4 **NFPA 2-2.3** *Analyze incidents and identify the fire, explosion and health hazards for materials present.*	Time *2.5*	*X*	*X*		*X*				Check if objective is adequately addressed. ☐ Comment: *Basic concepts, methods and roles of site management/scene set-up are covered.*
AWARE-5 **NFPA 2-4.1** *Given haz mat incidents, identify actions to protect responders and others and to control access.*	Time *1*				*X*				Check if objective is adequately addressed. ☐ Comment: *Methods, zones and general procedures are covered.*
AWARE-6 **NFPA 2-4.2** *Given haz mat incidents, identify appropriate notification procedures.*	Time *n/a*								Check if objective is adequately addressed. ☐ Comment: *General information is presented throughout, more training on local SOPs is required.*

1997 Response Course Assessment Worksheet

1 Organization Sponsoring Course	2 Individual to Contact — *Contact for further information regarding the course (name, address, phone).*

3 General Course Description

(A) Course Title _____

_____

(B) Edition Number and/or Date _____ (C) Length (hours) _____

(D) Course Purpose or Goal _____

_____

_____

_____

4 Target Audiences, Competencies, Objectives

See instructions. Check each box if yes. If only selected objectives are addressed, describe. Attach appropriate course assessment worksheets. Continue as needed in Section 10: Special Course Characteristics.

(A) Target Audiences

☐ Course is suitable for all potential responders meeting competency prerequisites.

☐ Course is targeted for specific disciplines.

- ☐ Fire
- ☐ Law Enforcement
- ☐ EMS
- ☐ Hospital
- ☐ Public Works
- ☐ Private Sector Employees
- ☐ Other _____

(B) Competencies and Objectives Addressed in Course

All Objectives	Selected Objectives	Competencies
☐	☐	First Responder Awareness
☐	☐	First Responder Operations
☐	☐	Hazardous Materials Technician
☐	☐	Incident Commander
☐	☐	Hazardous Materials Branch Chief
☐	☐	Safety Officer at Hazardous Materials Incidents
☐	☐	Hazardous Materials Branch Safety Officer
☐	☐	Specialist Employee
☐	☐	Private Sector Offsite Specialist Employee B
☐	☐	Private Sector Offsite Specialist Employee C
☐	☐	Hazardous Materials Specialist
☐	☐	Private Sector Offsite Specialist Employee A
☐	☐	Technician with a Tank Car Speciality
☐	☐	Technician with a Cargo Tank Speciality
☐	☐	Technician with an Intermodal Tank Speciality
☐	☐	Emergency Medical Service Level 1
☐	☐	Emergency Medical Service Level 2
☐	☐	Hospital Emergency Room Personnel
☐	☐	Other

Describe Selected Objectives *(below or in Sec. 10)*

_____

_____

_____

☐ **Continued in Section 10?**

5 Course Materials

See instructions. Check each box if yes and indicate quantities as requested. Explain as needed in Section 10: Special Course Characteristics.

(A) Instructional Materials

- ☐ Instructor Guide (_____ pages)
- ☐ Student Manual (_____ pages)
- ☐ Handouts (_____ pages)
- ☐ Slides (_____ number)
- ☐ Overhead Transparencies (_____ number)
- ☐ Videotapes (____) number) (_____ total length in minutes)
- ☐ Slide/tapes (____) number) (_____ total length in minutes)
- ☐ Audiotapes (____) number) (_____ total length in minutes)
- ☐ Computer floppy discs (_____ number) (_____ format(s))
- ☐ Computer CDs (_____ number) (_____ format(s))
- ☐ Other _____

(B) Evaluation Materials

- ☐ Student tests
  - ☐ Pretest ☐ End of units ☐ End of course
- ☐ Delivery Assessment Instruments
  - ☐ End of units ☐ End of course
- ☐ Other _____

(C) Refresher Training Materials

- ☐ Refresher training guidance included
- ☐ Refresher training materials included

If yes, please describe in Sec. 10 Special Course Characteristics

(D) Physical Skills Laboratory and Demonstration Equipment & Supplies

- ☐ Are standard issue responder equipment and protective gear used in course?
- ☐ Are specialized hazardous materials response equipment and protective gear used in course?
- ☐ Are incident mock-ups, scenario equipment and props use in course (drums, tanks, valve assemblies, etc.)?

Please describe the use of any specialized equipment or supplies in Section 10 Special Course Characteristics

☐ **Continued in Section 10?**

6 Course Delivery Formats

See instructions. Check which formats are used to deliver the course. If format varies by module, note which modules apply to each format. Explain as needed in Section 11: Special Course Delivery Considerations..

Check if yes.

- ☐ Independent study use (no instructor)
- ☐ Field delivery run by centralized office
- ☐ Broadcast or televised delivery
- ☐ Local department/ employer delivery
- ☐ Special facility or fixed-site delivery
- ☐ Other _____

If the course is delivered using more than one format, please explain.

_____

_____

_____

☐ **Continued in Section 10?**

7 Unit or Module Summary

See instructions. Provide module title, length in hours or fraction, and check instructional methodologies employed. Use Section 12: Continuation, if necessary.

Unit / Module Number	Unit / Module Length (in Hours)	Unit / Module Has Potential For Use As Stand-Alone Training Module	Unit / Module Title	Instructional Methodologies Used In Unit/Module: Lecture / Discussion	Skills Demonstration / Performance Modeling	Audiovisual Presentation	Classroom Activities: Individual Student Work	Classroom Activities: Group and/or Table Top Work	Physical Skills Laboratory: Hands-On Student Work	Field Exercises or Drills	Self-Study	Computer-Assisted Instruction	Written Testing: Pre-Test, Unit Tests, Post-test	Other

☐ **Continued in Section 12?**

8 Materials From Other Programs Used In This Course

See instructions. Applies to major sources only. Explain as needed in Section 12: Continuation.

Organization	Title of Program or Course Used	Comment

☐ Continued in Section 12?

9 Factors Affecting Use of Course by Other Organizations

See instructions. Check if yes. Explain as needed in Section 11: Special Course Delivery Considerations.

- ☐ Do course materials have to be purchased?
- ☐ Do copyright limitations apply to use of the materials?
- ☐ Are there any special instructor skills or experience requirements?
- ☐ Are there any special facility or equipment requirement that would impede another jurisdiction's use of this course?
- ☐ Are there any special competency requirements or prerequisites for students?
- ☐ Does a train-the-trainer program exist?
- ☐ Are optional activities provided for different disciplines (fire, public works, EMS, etc.)?
- ☐ Are course texts available on computer disc?
- ☐ Are course evaluations available for review?
- ☐ Are summaries of student achievement available for review?
- ☐ Do the majority of the scenarios apply to other locales or geographic regions?

☐ Continued in Section 11?

10 Special Course Characteristics

See instructions. Identify special or innovative characteristics of the course which would be of interest to other trainers, such as new activity approaches, new videos, unusual content sequencing, etc. If clarifying entries in other sections, identify which sections.

11 *Special Course Delivery Considerations*

See instructions. Identify training issues, special requirements or challenges not identified elsewhere that would affect another organization using or adapting this course. If clarifying entries in other sections, identify which sections.

12 *Continuation*

See instructions. Use this section to continue comments that exceed space allowed in other sections. For each comment, identify section being continued.

***1997** Response Course Objectives Worksheet*

First Responder Awareness: Required Objectives

Course Title

Organization

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(i), and are abbreviated below as OSHA AWARE-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA AWARE-A *Define hazardous substances and identify risks at hazardous materials incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-B *Identify potential outcomes at hazardous materials incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-C *Recognize presence of hazardous materials at incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-D *Identify hazardous substances present at incidents.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-E *Understand role of first responder at awareness level in emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA AWARE-F *Given haz mat incident, determine additional resources needed & notify comm, center.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Response Course Objectives Worksheet - **1997**
First Responder Awareness: Required Objectives

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1997 Response Course Objectives Worksheet

First Responder Awareness: Recommended Objectives

Course Title

Organization

First Responder Awareness training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 2: Competencies for the First Responder at the Awareness Level. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
AWARE-1 **NFPA 2-1.3** *Understand role of first responder at the awareness level.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-2 **NFPA 2-2.1** *Detect the presence of hazardous materials at incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-3 **NFPA 2-2.2** *Survey incidents from safe location and identify the hazardous materials present.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-4 **NFPA 2-2.3** *Analyze incidents and identify the fire, explosion and health hazards for materials present.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-5 **NFPA 2-4.1** *Given haz mat incidents, identify actions to protect responders and others and to control access.*	Time								Check if objective is adequately addressed. ☐ Comment
AWARE-6 **NFPA 2-4.2** *Given haz mat incidents, identify appropriate notification procedures.*	Time								Check if objective is adequately addressed. ☐ Comment

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1997 Response Course Objectives Worksheet

First Responder Operations: Required Objectives

Course Title

Organization

First Responder Operations training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(ii), and are abbreviated below as OSHA OPS-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA OPS-A *Know basic hazard and risk assessment techniques.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-B *Select and use personal protective equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-C *Define basic hazardous materials terms.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-D *Know basic control, containment, and/or confinement operations.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-E *Know basic decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA OPS-F *Know SOPs and termination procedures.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Response Course Objectives Worksheet - **1997**
First Responder Operations: Required Objectives

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***1997** Response Course Objectives Worksheet*

First Responder Operations: Recommended Objectives

Course Title

Organization

First Responder Operations training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 3: Competencies for the First Responder at the Operations Level. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OPS-1 **NFPA 3-1.3** *Understand role of first responder at the operational level.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-2 **NFPA 3-2.1** *Survey the hazardous materials incident.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-3 **NFPA 3-2.2** *Collect hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-4 **NFPA 3-2.3** *Predict behavior of a material and its container.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-5 **NFPA 3-2.4** *Estimate the potential harm within the endangered area.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-6 **NFPA 3-3.1** *Describe response options.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

First Responder Operations: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OPS-7 **NFPA3-3.2** *Identify defensive options.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-8 **NFPA3-3.3** *Determine appropriateness of personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-9 **NFPA3-3.4** *Identify emergency decontamination procedures.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-10 **NFPA3-4.1** *Establish and enforce scene control procedures.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-11 **NFPA3-4.2** *Initiate the incident management system.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-12 **NFPA 3-4.3** *Demonstrate the ability to use personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-13 **NFPA 3-4.4** *Perform defensive control actions.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-14 **NFPA 3-5.1** *Evaluate status of defensive actions.*	Time								Check if objective is adequately addressed. ☐ Comment
OPS-15 **NFPA3-5.2** *Communicate the status of the response.*	Time								Check if objective is adequately addressed. ☐ Comment

1997 Response Course Objectives Worksheet

Haz Mat Technician: Required Objectives

Course Title

Organization

Haz Mat Technician training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(iii), and are abbreviated below as OSHA TECH-A through I. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA TECH-A *Know how to implement employer's emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-B *Know classification, identification and verification of known and unknown materials using field survey equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-C *Demonstrate assigned role in incident command system.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-D *Select and use proper specialized personal protective equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA TECH-E *Identify and demonstrate use of hazard and risk assessment techniques.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Continue On Next Page

***1997** Response Course Objectives Worksheet*

Haz Mat Technician: Required Objectives (Continued)

Required Objective		Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
			Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA TECH-F	*Demonstrate advanced control, containment, and/or confinement operations.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA TECH-G	*Identify and demonstrate decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA TECH-H	*List and describe incident termination procedures.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA TECH-I	*Define basic chemical and toxicological terms and describe basic chemical and toxicological behavior.*	Time								Check if objective is adequately addressed. ☐
		Comment								

Response Course Objectives Worksheet - **1997**
Hazardous Materials Technician: Required Objectives

1997 Response Course Objectives Worksheet

Haz Mat Technician: Recommended Objectives

Course Title

Organization

Haz Mat Technician training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter4:Competencies for the Hazardous Materials Technician. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TECH-1 **NFPA 4-1.3** *Understand role of hazardous materials technician.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-2 **NFPA 4-2.1** *Using appropriate equipment, identify special containers, identify of classify unknown materials, verify identification of hazardous materials, and determine concentration.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-3 **NFPA 4-2.2** *Using printed & technical resources, computer data, & monitoring equipment, collect and interpret hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-4 **NFPA 4-2.3** *Describe facility & transportation container damage.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-5 **NFPA 4-2.4** *Predict likely behavior of haz mat in facility and trans. incidents involving multiple haz mat.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

***1997** Response Course Objectives Worksheet*

Haz Mat Technician: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TECH-6 **NFPA 4-2.5** *Estimate size, shape, & concentration of release, using computer modeling, monitoring equipment and specialists.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-7 **NFPA 4-3.1** *Describe response objectives for facility and transportation incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-8 **NFPA4-3.2** *Identify defensive, offensive and nonintervention action options.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-9 **NFPA 4-3.3** *Determine appropriate personal protective equipment for action options.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-10 **NFPA4-3.4** *Select decontamination procedures and determine equipment required.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-11 **NFPA 4-3.5** *Develop plan of action, including safety consid., consistent with local emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-12 **NFPA 4-4.1** *Perform assigned role within local incident mgmt system.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-13 **NFPA 4-4.2** *Don, work in and doff liquid splash-, vapor-protective, and other specialized personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TECH-14 **NFPA 4-4.3** *Select tools, equipment, and materials and identify precautions for controlling releases.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-15 **NFPA4-5.1** *Evaluate effectiveness of control functions.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-16 **NFPA 4-6.1** *Participate in debriefing of incident.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-17 **NFPA4-6.2** *Provide operational observations of activities performed in hot & warms zones.*	Time								Check if objective is adequately addressed. ☐ Comment
TECH-18 **NFPA 4-6.3** *Complete reporting & documentation requirements consistent with SOPs and organization's emer. plan.*	Time								Check if objective is adequately addressed. ☐ Comment

1997-Response Course Objectives Worksheet
Hazardous Materials Technician: Recommended Objectives

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1997 Response Course Objectives Worksheet

Incident Commander: Required Objectives

Course Title

Organization

Incident Commander training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(v), and are abbreviated below as OSHA I.C.-A through F. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA I.C.-A *Implement employer's incident command system.* ***A.1*** *Demonstrate establishing command, organizing resources, assigning subordinate units and personnel.* ***A.2*** *Demonstrate transfer of command.* ***A.3*** *Define roles & responsibilities of dafety officer.*	Time								Check if objective is adequately addressed. ☐ Comment
OSHA I.C.-B *Implement employer's emergency response plan* ***B.1*** *Identify substances and describe appropriate site analysis, engineering controls, maximum exposure limits, handling procedures.* ***B.2*** *Determine and describe appropriate emergency operations.*	Time								Check if objective is adequately addressed. ☐ Comment
OSHA I.C.-C *Identify hazards & risks associated with chemical protective clothing.* ***C.1*** *Determine when it is safe to discontinue positive pressure self-contained breathing apparatus.* ***C.2*** *Minimize personnel working in exposure areas.* ***C.3*** *Identify back-up, rescue and qualified basic life support requirements.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Incident Commander: Required Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA I.C.-D *Demonstrate implementation of local emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA I.C.-E *Know State emergency response plan and Federal regional response team.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA I.C.-F *Identify and demonstrate management of decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
	Comment								

Response Course Objectives Worksheet - **1997**
Incident Commander: Required Objectives

1997 Response Course Objectives Worksheet

Incident Commander: Recommended Objectives

Course Title

Organization

Incident Commander training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 5: Competencies for the Incident Commander. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
I.C.-1 **NFPA5-1.3** *Understand role of hazardous materials incident commander.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-2 **NFPA 5-2.1** *Using printed & technical resources, computer data, and monitoring equipment, collect and interpret hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-3 **NFPA 5-2.2** *Estimate potential outcomes within endangered area of facility and transportation incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-4 **NFPA 5-3.1** *Describe response objectives for facility and transportation incidents.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-5 **NFPA5-3.2** *Identify defensive, offensive, and nonintervention action options.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-6 **NFPA 5-3.3** *Approve appropriate personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment

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Incident Commander: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
I.C.-7 **NFPA5-3.4** *Develop plans of action for facility and transportation incidents, consistent with local emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-8 **NFPA5-4.1** *Identify requirements of local emergency response plan.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-9 **NFPA 5-4.2** *Demonstrate ability to direct resources in a safe and efficient manner.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-10 **NFPA5-4.3** *Identify appropriate information to provide to media and public officials.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-11 **NFPA5-5.1** *Evaluate progress of plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-12 **NFPA 5-6.1** *Demonstrate ability to effectively transfer command.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-13 **NFPA 5-6.2** *Given details of haz mat incident, conduct a debriefing of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-14 **NFPA5-6.3** *Given details of multi-agency haz mat incident, conduct a critique of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
I.C.-15 **NFPA5-6.4** *Report and document incidents consistent with local, State and Federal requirements.*	Time								Check if objective is adequately addressed. ☐ Comment

1997 Response Course Objectives Worksheet

Haz Mat Branch Officer: Recommended Objectives

Course Title

Organization

Haz Mat Branch Officer recommended objectives have their origin primarily in NFPA 472, Chapter 7: Competencies for the Hazardous Materials Branch Officer. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
HMBO-1 **NFPA 7-1.3** *Understand the role of hazardous materials branch officer.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-2 **NFPA7-2.1** *Given a haz mat incident, estimate potential outcomes within endangered areas.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-3 **NFPA 7-3.1** *Select appropriate personal protective equipment for action options specified in plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-4 **NFPA 7-3.2** *Develop a plan of action consistent with local emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-5 **NFPA 7-4.1** *Identify requirements of plan, including notification procedures and use of nonlocal resources.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-6 **NFPA 7-4.2** *Direct haz mat branch resources in safe and efficient manner.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Haz Mat Branch Officer: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
HMBO-7 **NFPA7-4.3** *Act as resource, provide information to incident commander or public info officer.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-8 **NFPA7-5.1** *Evaluate the progress of the plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-9 **NFPA 7-6.1** *Terminate the emergency phase of incident consistent with local emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-10 **NFPA 7-6.2** *Given details of incident, conduct debriefing of incident.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-11 **NFPA 7-6.3** *Given details of incident, conduct a critique of incident.*	Time								Check if objective is adequately addressed. ☐ Comment
HMBO-12 **NFPA7-6.4** *Report & document the incident, consistent with local, State, and federal requirements.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
Hazardous Materials Branch Officer: Recommended Objectives

1997 Response Course Objectives Worksheet

Safety Officer at Haz Mat Incidents: Required Objectives

Course Title

Organization

Training courses for the safety officer function may be assessed using either the required objectives for Safety Officer at Hazardous Materials Incidents or the recommended objectives for Hazardous Materials Branch Safety Officer in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(vii-viii), and are abbreviated below as OSHA S.O.-A through C. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective		Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
			Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA S.O.-A	*Identify and evaluate hazards at incident and provide direction to development of a safe response plan.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA S.O.-B	*Identify and evaluate unsafe operations activities, and/or conditions involving imminent danger.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA S.O.-C	*Given unsafe conditions, determine appropriate interventions, incl. altering, suspending or terminating selected response activities and coordinate those interventions with individual in charge of ICS.*	Time								Check if objective is adequately addressed. ☐
		Comment								

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1997 Response Course Objectives Worksheet

Haz Mat Branch Safety Officer: Recommended Objectives

Course Title

Organization

Training courses for the safety officer function may be assessed using either the required objectives for Safety Officer at Hazardous Materials Incidents or the recommended objectives for Hazardous Materials Branch Safety Officer in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 8: Competencies for the Haz Mat Branch Safety Officer. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
S.O.-1 **NFPA 8-1.3** *Understand role of the hazardous materials branch safety officer.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-2 **NFPA 8-2.1** *Given a haz mat incident, observe a scene and review and evaluate hazard and response information.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-3 **NFPA 8-3.1** *Given a haz mat incident, assist in planning a safe response.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-4 **NFPA 8-3.2** *Given a haz mat incident, provide observation-based recommendations regarding considerations for safety of on-site personnel.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-5 **NFPA 8-3.3** *Given a haz mat incident, assist in development of safe plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-6 **NFPA 8-3.4** *Identify safety precautions for plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Haz Mat Branch Safety Officer: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
S.O.-7 **NFPA 8-3.5** *Review selection of personal protective equipment required for a given action.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-8 **NFPA 8-3.6** *Review plan to identify safety considerations prior to plan implementation.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-9 **NFPA 8-3.7** *Review the EMS plan to ensure response personnel are provided medical care.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-10 **NFPA 8-4.1** *Perform duties consistent with local emer. response plan, SOPs and safety considerations.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-11 **NFPA 8-4.2** *Ensure personnel perform their tasks in safe manner by identifying safety considerations for control functions identified in plan of action.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-12 **NFPA 8-4.3** *Demonstrate proper procedure for conducting safety briefings.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-13 **NFPA 8-4.4** *Given a haz mat incident, assist in implementing and enforcing the safety considerations.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-14 **NFPA 8-4.5** *Maintain routine and emergency communication within the incident command structure.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
Hazardous Materials Branch Safety Officer: Recommended Objectives

Continue On Next Page

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
S.O.-15 **NFPA 8-4.6** *Identify whether team members regularly communicate status of work assignments.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-16 **NFPA 8-4.7** *Given a haz mat incident, assist in implementing exposure monitoring.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-17 **NFPA 8-5.1** *Evaluate the progress of the planned response.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-18 **NFPA 8-5.2** *Take corrective actions as necessary to ensure safety and health of persons in hot and warms zones.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-19 **NFPA 8-6.1** *Complete and submit reports, documentation and follow-up required.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-20 **NFPA 8-6.2** *Debrief haz mat branch personnel regarding site-specific occupational safety and health issues.*	Time								Check if objective is adequately addressed. ☐ Comment
S.O.-21 **NFPA 8-6.3** *Provide safety and health related critical observations of activities performed in hot and warm zones.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Specialist Employee: Required Objectives

Course Title

Organization

Specialist Employee training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(5), and are abbreviated below as OSHA SpEMP-1 through 3. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA SpEMP-1 *Given haz mat incident within area of technical expertise, provide technical advice or assistance within the incident command structure regarding the hazards of the substance and the magnitude of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment _____
OSHA SpEMP-2 *Given haz mat incident within area of technical expertise, provide technical advice or assistance within the incident command structure regarding potential response options.*	Time								Check if objective is adequately addressed. ☐ Comment _____
OSHA SpEMP-3 *Given haz mat incident within area of technical expertise, provide technical advice or assistance within the incident command structure to control, confinement and containment operations and to incident termination and evaluation activities.*	Time								Check if objective is adequately addressed. ☐ Comment _____

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1997 Response Course Objectives Worksheet

Specialist Employee: Recommended Objectives

Course Title

Organization

Specialist Employee training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 6: Competencies for Private Sector Specialist Employees, Section 6.2: Private Sector Specialist Employee C, and Section 6.3: Private Sector Specialist Employee B. To retain the integrity of the NFPA citations, the objectives are referred to respectively as SPEC(C) and SPEC(B), and are presented as separate groupings of objectives. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Private Sector Specialist Employee C

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(C)-1 **NFPA 6-2.1.3** *Demonstrate an understanding of the role of the private sector specialist employee C.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(C)-2 **NFPA 6-2.2.1** *Given an MSDS or other appropriate resource, advise the incident commander of the hazards and harmful effects of chemicals used in are of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(C)-3 **NFPA 6-2.2.2** *Advise the incident commander of characteristics of containers for chemicals used in area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(C)-4 **NFPA 6-2.3.1** *Advise the incident commander of response information for chemicals used in area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Private Sector Specialist Employee C

Private Sector Spec. Employee B On Next Page

***1997** Response Course Objectives Worksheet*

Specialist Employee: Recommended Objectives

Private Sector Specialist Employee B

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(B)-1 **NFPA 6-3.1.3** *Given an incident involving haz mat within the individual area of specialization, define the role and responsibilities of the private sector specialist employee B.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-2 **NFPA 6-3.2.1** *Given a chemical within area of specialization and a MSDS or appropriate resource, advise the incident commander of the chemical's hazards & harmful effects and potential consequences based on the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-3 **NFPA 6-3.2.2** *Given a container for chemicals within area of specialization, advise the incident commander of the characteristics and potential behavior of that container.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-4 **NFPA 6-3.2.3** *Given a chemical in area of specialization and the applicable monitoring equipment or the available predictive capabilities, advise the incident commander of the concentrations of the released chemical and the implications of that information to the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-5 **NFPA 6-3.3.1** *Given specific chemicals or containers within area of specialization and the appropriate resources, advise the incident commander of the potential response options and their consequences.*	Time								Check if objective is adequately addressed. ☐ Comment

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Private Sector Specialist Employee B (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(B)-6 **NFPA 6-3.3.2** *Given specific chemical and/or containers for chemicals within area of specialization and the appropriate resources, advises the incident commander of the appropriate personal protective equipment necessary for various response options.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-7 **NFPA 6-3.3.3** *Given a specific chemical within area of specialization and the available resources, identify appropriate decontamination methods for various response options.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-8 **NFPA 6-3.3.4** *Given a specific chemical within area of specialization and the available resources, advise the incident commander of federal or provincial regulations that relate to the handling, transportation, and/or disposal of that chemical.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-9 **NFPA 6-3.3.5** *Given a simulated incident involving chemicals and/or containers used in area of specialization, develop a plan of action (in conjunction with the incident commander), consistent with organization's emer. response plan and SOPs, for handling chemicals and/or containers in that incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-10 **NFPA 6-3.4.1** *Given an assignment by the incident commander within area of specialization, perform the assigned actions consistent with his or her organization's emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment

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***1997** Response Course Objectives Worksheet*

Specialist Employee: Recommended Objectives

Private Sector Specialist Employee B

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(B)-11 **NFPA 6-3.4.2** *Given an assignment by the incident commander within area of specialization, don, work in, and doff the appropriate personal protective equipment needed to implement the assigned response options, consistent with organization's emer. response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-12 **NFPA 6-3.5.1** *Given an incident involving specific chemicals and/or containers for chemicals within area of specialization, advise the incident commander of the effectiveness of the selected response options.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(B)-13 **NFPA 6-3.5.2** *Given a simulated incident involving chemicals and/or containers for chemicals used in area of specialization, complete the reporting and subsequent documentation requirements consistent with organization's emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
Specialist Employee (Private Sector Specialist Employee B: Recommended Objectives

1997 Response Course Objectives Worksheet

Haz Mat Specialist: Required Objectives

Course Title

Organization

Haz Mat Specialist training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Required objectives are defined in OSHA 29 CFR 1910.120 (q)(6)(iv), and are abbreviated below as OSHA HMSPEC A through I. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Required Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA HMSPEC-A *Implement the local emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-B *Understand the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-C *Describe the State emergency response plan.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-D *Select and demonstrate use of proper specialized chemical personal protective equipment.*	Time								Check if objective is adequately addressed. ☐
	Comment								
OSHA HMSPEC-E *Understand in-depth hazard and risk assessment techniques, and provide technical advice or assistance regarding hazards & potential magnitude of incident.*	Time								Check if objective is adequately addressed. ☐
	Comment								

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***1997** Response Course Objectives Worksheet*

Haz Mat Specialist:
Required Objectives (Continued)

Required Objective		Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Required Objective Adequately Addressed? Comment As Needed.
			Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
OSHA HMSPEC-F	*Demonstrate specialized control, containment, and/or confinement operations.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA HMSPEC-G	*Demonstrate the ability to determine and implement decontamination procedures.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA HMSPEC-H	*Demonstrate the ability to develop a site safety and control plan.*	Time								Check if objective is adequately addressed. ☐
		Comment								
OSHA HMSPEC-I	*Define chemical, radiological and toxicological terms and describe chemical, radiological and toxicological materials behavior.*	Time								Check if objective is adequately addressed. ☐
		Comment								

Response Course Objectives Worksheet - **1997**
Hazardous Materials Specialist: Required Objectives

1997 Response Course Objectives Worksheet

Course Title

Organization

Haz Mat Specialist: Recommended Objectives

Hazardous Materials Specialist training courses may be assessed using either the required objectives or the recommended objectives in the curriculum guidelines. Recommended objectives have their origin primarily in NFPA 472, Chapter 6: Competencies for Private Sector Employees, Section 6.4: Private Sector Specialist Employee A; Chapter 9: Competencies for the Technician with a Tank Car Speciality; Chapter 10: Competencies for the Technician with a Cargo Tank Specialty; and Chapter 11: Competencies for the Technician with an Intermodal Tanks Specialty. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Private Sector Specialist Employee A

NFPA 472, Chapter 6.4

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
SPEC(A)-1 **NFPA6-4.1.3** *Define the roles and responsibilities of the private sector specialist employee A.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-2 **NFPA 6-4.1.3(a)** *Analyze the chemicals and containers for chemicals used in org's area of specialization to determine the magnitude of the incident.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-3 **NFPA 6-4.1.3(b)** *Plan a response to an incident involving chemicals used in org's area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-4 **NFPA 6-4.1.3(c)** *Implement the planned response to an incident involving chemicals and containers used in org's area of specialization consistent with org's emergency response plan and SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment
SPEC(A)-5 **NFPA 6-4.1.3(d)** *Evaluate the results of the response to an incident involving chemicals and containers for chemicals used in area of specialization.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Private Sector Specialist Employee A

Tech. Tank Specialities On Next Pages

Technician with a Tank Car Specialty

NFPA 472, Chapter 9

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
TANK-1 **NFPA 9-1.3** *Understand the role of technician with a tank car specialty.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-2 **NFPA 9-2.1** *Given examples of damaged tank cars, describe type and extent of damage to each tank car and its fittings.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-3 **NFPA 9-2.2** *Predict the likely behavior of the tank car and its contents.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-4 **NFPA 9-3.1** *Given an analysis of an emergency involving tank cars, determine response options for each involved.*	Time								Check if objective is adequately addressed. ☐ Comment
TANK-5 **NFPA 9-4.1** *Implement selected response options safely and effectively.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Technician with a Tank Car Speciality

Cargo Tank and Intermodal Tank Specialities On Next Pages

Technician with a Cargo Tank Specialty

NFPA 472, Chapter 10

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
CARGO-1 **NFPA 10-1.3** *Understand the role of technician with a cargo tank specialty.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-2 **NFPA 10-2.1** *Given examples of damaged cargo tanks, describe type and extent of damage to each cargo tank and its fittings.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-3 **NFPA 10-2.2** *Predict the likely behavior of the cargo tank and its contents.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-4 **NFPA 10-3.1** *Given an analysis of an emergency involving cargo tanks, determine response options for each involved.*	Time								Check if objective is adequately addressed. ☐ Comment
CARGO-5 **NFPA 10-4.1** *Implement selected response options safely and effectively.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Technician with a Cargo Tank Speciality

Technician with an Intermodal Tank Speciality On Next Page

Technician with an Intermodal Tank Specialty

NFPA 472, Chapter 11

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
INTML-1 **NFPA 11-1.3** *Understand the role of technician with an intermodal tank specialty.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-2 **NFPA 11-2.1** *Given examples of damaged intermodal tank, describe type and extent of damage to each intermodal tank and its fittings.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-3 **NFPA 11-2.2** *Predict the likely behavior of the intermodal tank and its contents.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-4 **NFPA11-3.1** *Given an analysis of an emergency involving intermodal tank, determine response options for each involved.*	Time								Check if objective is adequately addressed. ☐ Comment
INTML-5 **NFPA 11-4.1** *Implement selected response options safely and effectively.*	Time								Check if objective is adequately addressed. ☐ Comment

End of Technician with a Intermodal Tank Speciality

1997 Response Course Objectives Worksheet

EMS Responder Level 1: Recommended Objectives

Course Title

Organization

EMS Responder Level 1 recommended objectives have their origin primarily in NFPA 473, Chapter 2: Competencies for EMS/HM Level 1 Responders. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(1)-1 **NFPA 2-1.3** *Demonstrate an understanding of the role of the emergency medical services responder level 1.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-2 **NFPA 2-2.1** *Determine hazards to responder and patient.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-3 **NFPA 2-2.2** *Assess patient to determine risk of secondary contamination.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-4 *Know facilities in local area capable of handling contaminated patients.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-5 **NFPA 2-3.1** *Describe role of EMS level 1 responder as identified in local emergency response plan or organization's SOPS.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-6 **NFPA 2-3.3** *Provide appropriate level of emergency medical care as specified by authority having jurisdiction.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

1997 Response Course Objectives Worksheet

EMS Responder Level 1: Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(1)-7 **NFPA 2-4.1** *Perform preparations necessary to treat and transport patients.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-8 **NFPA 2-4.2** *Demonstrate ability to administer proper treatment to patient.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-9 **NFPA 2-4.3** *Demonstrate ability to transport patient to appropriate facility.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-10 *Describe patient decontamination process.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(1)-11 **NFPA 2-5.1** *Perform reporting, documentation, and follow-up required of EMS component according to local emer. response plan.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
EMS Responder Level 1: Recommended Objectives

1997 Response Course Objectives Worksheet

EMS Responder Level 2: Recommended Objectives

Course Title

Organization

EMS Responder Level 2 recommended objectives have their origin primarily in NFPA 473, Chapter 3: Competencies for EMS/HM Le vel 2 Responders. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(2)-1 **NFPA 3-1.3** *Demonstrate an understanding of the role of emergency medical service responder level 2*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-2 **NFPA 3-2.1** *Given a haz mat incident, determine the hazards present to both the responder and the patient in that situation.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-3 **NFPA 3-2.2** *Given a haz mat incident, assess the patient and conditions to determine risk of secondary contamination.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-4 **NFPA 3-3.1** *Given a plan of action by the incident commander and EMS role in haz mat incident, describe importance of coordination between agencies at the scene.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-5 **NFPA 3-3.2** *Given a haz mat incident, plan a response to provide appropriate level of emergency medical care to persons involved and to provide medical support to haz mat response personnel.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

EMS Responder Level 2
Recommended Objectives (Continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
EMS(2)-6 **NFPA 3-3.3** *Given the name of the hazardous material and the type, duration, and extend of exposure, determine if the protective clothing and equipment available to EMS personnel is appropriate to implement the planned response.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-7 **NFPA 3-4.1** *Given a plan for providing patient care at a haz mat incident, perform the preparations necessary to receive the patient for decontamination, treatment, and transport; and demonstrate proper donning, doffing and usage of personal protective equipment.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-8 **NFPA 3-4.2** *Provide or coordinate patient care.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-9 **NFPA 3-4.3** *Demonstrate the ability to coordinate patient care activities, including, treatment, disposition, and transportation of patients.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-10 **NFPA 3-4.4** *Perform medical support of haz mat incident response personnel.*	Time								Check if objective is adequately addressed. ☐ Comment
EMS(2)-11 **NFPA 3-5.1** *Given the termination of a haz mat incident, complete the reporting, documentation, and EMS termination activities as required by the local emergency response plan or org's SOPs.*	Time								Check if objective is adequately addressed. ☐ Comment

Response Course Objectives Worksheet - **1997**
EMS Responder Level 2: Recommended Objectives

1997 Response Course Objectives Worksheet

Hospital Personnel: Recommended Objectives

Course Title

Organization

Hospital Personnel recommended objectives have their origin primarily in the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) standards for handling contaminated patients. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.

An objective is considered "adequately addressed" in this course assessment when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes required to accomplish the objective safely and effectively during hazardous materials response. Refer to the accompanying Response Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	Skills Test	Other	None	
HOSP-1 *Describe the ways in which a medical center or hospital can become involved in a haz mat event or response effort.*	Time								Check if objective is adequately addressed. ☐ Comment
HOSP-2 *Describe some of the key issues involved in the reception of a patient contaminated by or exposed to a chemical substance.*	Time								Check if objective is adequately addressed. ☐ Comment
HOSP-3 *Describe the need for the hospital to develop emergency response plans.*	Time								Check if objective is adequately addressed. ☐ Comment
HOSP-4 *Describe the hospitals documented management plan for the environment of care to be provided during a haz mat emergency that considers all factors of the emergency response.*	Time								Check if objective is adequately addressed. ☐ Comment

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Hazardous Materials
Planning Course Assessment

Planning Course Assessment
DIRECTIONS

These instructions describe the methodology for assessing hazardous materials planning courses. Section 1, **General Information**, explains the purpose and nature of the assessment process. Section 2, **Performing a Course Assessment**, identifies basic steps for completing the assessment instruments. Section 3, **Specific Instructions**, provides block-by-block directions for filling out the instruments. A completed sample is attached, showing the assessment of the National Fire Academy course *Initial Response to Hazardous Materials Incidents: Basic Concepts*.

Every effort has been made to keep these instruments and instructions as simple and useful as possible. However, assessing adult training activities inherently involves some time and work.

1. GENERAL INFORMATION

Purpose of the Planning Course Assessment Worksheet

The Response Course Assessment Worksheets are designed to (1) gather descriptive information about individual hazardous materials training activities in a standardized format, and (2) facilitate comparison of course content with the recommended training requirements identified in the Hazardous Materials Emergency Preparedness (HMEP) grant program document *Guidelines for Public Sector Hazardous Materials Training (Guidelines)*. The data can be used to:

- Evaluate the scope of existing courses relative to Federal and other national standards and guidelines.
- Disseminate information to state and local training managers nationwide about existing courses.
- Help training agencies assess the usefulness of existing courses for their own needs.

Why Assess Planning Courses?

State and local agencies with hazardous materials training responsibilities can use the results of the assessment process for the purpose of:

1. Certifying compliance and/or verifying compatibility of training with the HMEP grant program curriculum Guidelines.
2. Analyzing and revising the current training plan.
3. Developing new courses or revising current ones to address unmet training needs.
4. Assessing whether to adopt or adapt an outside course for use within the organization or jurisdiction.

6. Communicating characteristics of existing courses to peer training managers in other organizations and jurisdictions.

7. Evaluating the capabilities of currently trained State and local personnel involved in planning.

8. Documenting and explaining the scope of training activities to outside decision-makers and the public.

The training needs of individual agencies or jurisdictions may differ from those defined here. Many factors that affect the quality of training are outside the scope of this assessment process. Training managers may supplement the results of this assessment process through peer instructor evaluation of deliveries, professional review of course materials, in-depth student and instructor interviews, student testing, and other forms of expert opinion.

Who Should Complete a Planning Course Assessment?

A course assessment should be conducted by any organization with hazardous materials planning training requirements.

All courses used in the HMEP grant program should be assessed. This includes Federal, State, tribal, and Protectorate, national professional association, and private sector courses used by grantees in their public sector training curriculums. Each course should be formally assessed by only one sponsoring organization.

HMEP grantees are responsible for assessing those courses in their curriculums (1) which they have developed entirely or modified for their specific use and (2) which are provided by private sector sources and contractors (other than national associations) and are used by the HMEP grantees use as part of their public sector curriculum. HMEP grantees are not responsible for assessing Federal, national association courses, or courses from other HMEP grantee curriculums. Federal and national association providers of training will be asked to provide assessment of their respective programs which are in use by HMTA grantees.

Assessment Evaluator Qualifications

It is recommended that assessment evaluators have the following minimum qualifications:

- A thorough understanding of the course purpose, training objectives, content, and instructional methodologies.

- Be familiar with the course delivery requirements, related administrative considerations, and student evaluation results.

- Have in-depth knowledge of all target training audiences, including their planning roles, job tasks, and required competencies.

- Have knowledge of hazardous materials planning processes, responsibilities, and applicable regulations and standards including those promulgated by OSHA, EPA, and NFPA.

- Have experience and credentials in applying the principles and techniques of adult education to emergency services and planning audiences.

Given the nature of the assessment process, sponsoring organizations may wish to consider using a workgroup approach, particularly for major courses. Assessment evaluators may include members of the course design and development team; experienced instructors, training program administrators, and course managers; qualified members of the training audience; and other hazardous materials experts as deemed appropriate.

2. PERFORMING A PLANNING COURSE ASSESSMENT

Initial Considerations

Before filling out the assessment instruments, participants should understand the purpose and requirements of the assessment process, and be familiar with the HMEP *Guidelines*.

The first step is to determine the desired depth of the analysis. Generally, one set of assessment instruments is completed for each course. If a course is comprised of major modules or sections that could serve as stand-alone courses in themselves it may be desirable to complete a separate set of instruments for each of those modules or sections of the course.

To decide the appropriate level of assessment consider the possible ways other emergency services organizations may use the training, the information, and decision-making needs of peer training managers. If, in your judgement, a significant number of agencies would benefit by more detailed information, complete one set of instruments for each major module or section of the course. Otherwise, fill out one set of instruments for the entire course.

General Steps in the Process

You are now ready to begin the course assessment. Following the general steps listed below will help you prepare the forms quickly and accurately.

Step 1: Review Course Training Materials — Gather and review all course instructional materials. These may include plans of instruction, content outlines, student manuals, instructor guides, audiovisual presentations (films, videotapes, slide-tapes, etc.), job aids, reference materials, and handout materials.

Step 2: Review Course Delivery Data — Gather and review materials that describe the effectiveness of previous course deliveries. These may include data on course offerings and participants, student and instructor training evaluations, student test summaries, and long-term performance evaluation results. You may interview or survey persons knowledgeable about course deliveries.

Step 3: Gather Related Documents — Obtain copies of other documents that may be useful in the course assessment process. Examples might include related federal legislation and regulations, copies of relevant NFPAstandards, source materials used in the development of the course, refresher training and train-the-trainer materials, course promotional materials, technical documents referenced in the course.

Step 4: Select Appropriate Instruments — Each course assessment requires filling out two separate instruments:

- **Planning Course Assessment Worksheet** describes the course and related delivery considerations. The basic format of the instrument is the same for all training activities assessed under this process. Copies of the instrument can be made from the master copy accompanying these instructions.

- **Planning Course Objectives Worksheet(s)** assesses course content relative to the HMEP *Guidelines*, and identifies the rrecommended training objectives for all competency areas addressed in the course. Separate Course Objectives Worksheets are available for the following competency areas:

  Planning Orientation
  Planning Essentials
  Planning Specialities
    Commodity Flow Study
    Hazard Analysis
    Capability Assessment
    Planning for Protective Actions
    Plan Implementation and Maintenance
    Facility Planning
    Planning for Public Educaiton

  You should complete a separate Course Objectives Worksheet for each competency area addressed in the course. Make copies of the appropriate worksheets from the master copies accompanying these instructions. (More information is provided under Specific Instructions, Planning Course Assessment Worksheet.)

Step 5: Fill in the Instruments — The block-by-block instructions for the instruments begin below. If more space is needed for your answers, use Section 12, Continuation, and attach separate sheets, as needed.

For most courses, the process can take approximately one to two hours per day of training depending on the complexity of the course, the number of people participating, their familiarity with the instructional materials, the desired workgroup process, and other factors.

Step 6: Using the Completed Instruments — The completed instruments should be filed as documentation of your organization's finished HMEP self-assessment of response courses. They can also be used to review your curriculum for completeness and to support dialogue with other training systems regarding your programs. For submission of the information into the HMEP Course Assessment Project, please use the enclosed return envelope or equivalent and send copies of the completed Response Course Assessment Worksheet with Course Objectives Worksheets attached for each course assessed to:

William Lewis
HMEP Course Assessment Project
National Emergency Training Center, FEMA
16825 South Seton Avenue
Emmitsburg, MD 21727

If you have any questions or would like assistance in completing your course assessment, call William Lewis (301) 447-1009, or Jennifer Krietz (301) 447-1585, or FAX (301) 447-1588.

3. SPECIFIC INSTRUCTIONS

This section provides detailed instructions for filling out the Planning Course Assessment Worksheet and the Course Objectives Worksheet. A completed sample of the instruments is attached. Please read these directions carefully as you proceed.

Planning Course Assessment Worksheet

Block 1: Organization Sponsoring Course

Enter the name and address of the Sponsoring Organization (the agency that has primary responsibility for the design and content of the course, and which maintains associated rights) in Block 1. Include subdivision titles, as appropriate.

Block 2: Individual to Contact

Enter the name, mailing address, and phone number of a person assigned to serve as a contact for federal agencies, State and local training managers, and others interested in learning more about the course. This person should be knowledgeable about the course and able to answer questions about the assessment process and results.

Block 3: General Course Description

A. Course Title — Enter the complete formal title of the course, including subtitles.

B. Edition Number and/or Date — Enter the official course number or edition/revision number and date which is used to identify the course. This number typically appears on the cover or title page of the instructional materials.

The identifying number should refer to the entire course, not separate elements such as the student manual, instructor guide, or videotapes. Do not list the International Standard Book Number (ISBN), Library of Congress Catalog Card Number, or other publishing reference number. For published works, enter the most recent publication date, but not the date of later reprintings (if any).

C. Length (hours) — Enter the length or duration of classroom hours per course. Course length includes all educational activities that are part of the course.

D. Course Purpose or Goal — The course purpose or goal is a brief statement (one to three sentences) that broadly defines the desired outcome(s) of the total educational experience, and attempts to clarify the competencies or capabilities that students should possess after having satisfactorily completed all course requirements. This goal is met when all training objectives identified for the course have been achieved. As a rule of thumb, consider how best to complete the sentence “Having successfully completed the course, students will be able to....”

Block 4: Target Audiences, Competencies and Objectives

A. Target Audiences — For purposes of this assessment, target audiences are broadly defined as groups with similar organizational missions in hazardous materials planning. These include emergency management personnel, emergency services personnel, public works personnel, public officials, private sector representatives, and others.

Identify the target audience categories for which this course is suitable by checking the appropriate boxes on the form. List other audiences that would benefit by this training.

B. Competencies and Objectives Addressed in Course — Competency areas are defined as the different planning roles that public sector employees may be required to perform as participants in the planning process at the local, state and federal levels. The competency areas listed on the assessment form follow the categories identified in the HMEP *Guidelines*.

An individual course may address parts of a competency area, a total competency area, or multiple competency areas. To determine which competency area(s) your course addresses, you must first compare the course content with the training objectives identified for each area. The objectives are listed in the HMEP *Guidelines* and are duplicated on the respective Course Objectives Worksheets.

After determining which competency areas your course addresses, check the appropriate boxes on the form. If the course addresses all the objectives in the competency area check "All"; if the course addresses only a portion of them check "Selected". You may need to check one or more competency areas. If you check "Selected" for any competency area, briefly explain the scope of the course in the space provided on the form. If more space is needed, continue in section 10: Special Course Characteristics. (Note: the description you provide should expand on and clarify the course purpose or goal statement entered in Block 3.)

Reminder: Fill out Course Objectives Worksheets for each competency area you check here, whether "All" or "Selected."

Block 5: Course Materials

A. Instructional Materials — Check the appropriate boxes to indicate which of the listed types of instructional materials are used in delivering the course. Enter the correct quantities for each type of material, as specified on the form. If separate refresher training materials are available, please describe them in Section 10: Special Course Characteristics. List other types of instructional materials used in the course (e.g., job aids, reference documents, films, computer software) in the space provided, continuing as necessary in Section 10: Special Course Characteristics.

B. Training Evaluation Materials — Check the appropriate boxes to indicate which of the listed types of evaluation materials are used in the course. If evaluation approaches other than student tests or instructor/student assessments are used, describe fully in Section 10: Special Course Characteristics.

C. Refresher Training Materials— Check the appropriate boxes to indicate whether refresher training guidance and/or materials are included in the course package. Describe focus, scope and competency priorities of any refresher training components in Section 10: Special Course Characteristics

D. Demonstration Equipment and Supplies — If special equipment or supplies are used in the delivery of the course, check the appropriate box(es) and explain briefly in Section 10: Special Course Characteristics. These materials include any props, tools, supplies, apparatus, equipment, computer display systems, or other instructional aids that would not be readily available in a typical training environment.

Block 6: Course Delivery Formats

Courses are designed for use in certain settings or environments, depending on the resources required for delivery, nature of the instruction, size and location of the target audience, cost considerations, and many other factors. Typical formats for planning training include:

- Independent student use — self-contained educational materials designed for use by individual target audience members without ongoing instructor support. (Note: this category includes computer-assisted instruction and interactive videodisc presentations).

- Local department/employer delivery — training that can be delivered by public sector organizations with the resources and capabilities commonly available at the local level.

- Field delivery run by centralized office — training delivered locally, but administered and perhaps staffed by a centralized facility, such as the Emergency Management Institute, State Fire Marshal's office, regional training academy, or private university.

- Special facility or fixed-site delivery — training that must be conducted on-site at a specific facility because it employs large, non-transportable equipment (such as large table top displays, specialized simulation structures, etc.) or because other instructional considerations (such as co-locating with another program) restrict delivery of the course to the specific site.

- Broadcast or televised delivery — training designed for delivery to groups of students via teleconference, broadcast television, closed-circuit television, radio, or other similar instructional media.

Check the box for the delivery format that applies to the course. In most cases, only one delivery format should be marked. Sometimes, however, multiple delivery formats may be possible for the same course (e.g., local department/employer delivery or field delivery run by a centralized office). In other cases, different modules may be delivered using different instructional formats. If more than one delivery format applies, check the appropriate boxes and explain briefly.

Block 7: Unit or Module Summary

Use Block 7 to list the major modules, units, chapters, or sections of the course. Include the unit/module number, planned or expected duration in hours (see the instructions for Block 3), and title. If the sum of the hours shown here does not match the total for the course reported in Block 3, explain in Section 10, Special Course Characteristics.

For each unit/module, indicate whether it could serve in other curriculums as a stand-alone module. The purpose of this information is to assist other training managers in determining whether the material could be incorporated into their programs. In general, a unit has potential as a stand-alone training module if (1) there is closure within the unit of student learning including demonstration of mastery of the material, and (2) if the material is not dependent for coherency or learning upon the unique sequence of content in the preceding and following units of the course.

In addition, identify the types of instructional methodologies used in each unit/module by checking one or more of the boxes on the form. Check other methodologies (e.g., role play, interactive videodisc, behavior modeling, etc.) in the space provided.

Block 8: Materials From Other Programs Used in Course Development

Source materials are training programs, job task analyses, research reports, technical manuals, etc. that are used in developing the course. By identifying these source materials it will help peer training managers and others to:

- Understand the course based on familiarity with the source materials.
- Identify similarities and differences among training activities and programs.
- Evaluate appropriate applications of the course.

In this section of the form, you are asked to identify major source materials used in developing the course. Include only those materials that were used extensively or that contributed significantly to the final form and content of the course. Do not list others whose impact was less important, even if they were researched as part of the course design and development process. For each major source material, fill in the title and the

name of the organization that developed it. Then list the module/unit numbers (from Block 7) of the course that were strongly influenced by the source material. If the source material applies to the entire course, write "all." Explain as necessary in Section 12: Continuation.

Block 9: Factors Affecting Use of Course By Other Organizations

Many factors must be weighed when considering whether to adopt or adapt an existing course: associated costs, delivery requirements, compatibility with mission and audiences, ability to modify, available support services, ease of use. This section of the assessment form includes a checklist of these factors to help other training managers make decisions about using the course for their own needs.

Review the questions and check the appropriate box for each one that you answer affirmatively. Then, using this checklist as a "mind jogger," write in Section 11: Special Delivery Characteristics a brief summary of all major factors that could affect use of the course by other agencies. In your narrative, try to address typical decision-making needs and obstacles faced by training managers in emergency services organizations when developing, adapting, or conducting training. If more space is needed, use Section 12, Continuation.

Blocks 10-12

Use Blocks 10-12 to complete your response to other sections of the form (see the instructions for Blocks 4 through 9). Keep your responses as clear as possible.

Planning Course Objectives Worksheets

The Planning Course Objectives Worksheet is a tool to help you determine whether the course adequately addresses minimum training objectives set forth in the HMEP Guidelines.

Worksheets exist for each of nine (9) competency areas. You should complete a separate worksheet for each competency area addressed in the course (see Block 4 of the Planning Course Assessment Worksheet).. The competency areas are:

Planning Orientation
Planning Essentials
Planning Specialities
- Commodity Flow Study
- Hazard Analysis
- Capability Assessment
- Planning for Protective Actions
- Plan Implementation and Maintenance
- Facility Planning
- Planning for Public Education

Enter the course title and name of the sponsoring organization on each form you fill out. The training objectives are listed in the left column. You may use either the required or the recommended objectives for your assessment. For each training objective, work horizontally across the page to make three determinations for each objective:

- The course time spent on the objective.
- The methods used to demonstrate student achievement of the objective.
- Whether the objective is adequately addressed in the course.

Course Time Spent On Objective

Estimating the amount of course time spent on each objective provides a useful indicator of the scope or depth of training in each area. More course time implies the opportunity for more in-depth instruction, and vice-versa. Estimating training time can be relatively straightforward for courses whose objectives are structured similarly to the competency organization in the HMEP *Guidelines*. In these situations, you need only analyze a typical course schedule or training agenda to determine how much time is allocated to each objective. Round the estimates to the nearest tenth (0.1) hour. If precise estimates are difficult, break the course down at least to half-hour (0.5) increments.

For courses that do not directly match the objectives or have a mix of origins, estimating training time will require more effort. You must review the course content using the following general procedures:

1. Think through the knowledge, skills, and attitudes (KSAs) needed by a typical student to achieve the training objective.

2. Identify all course content related to these KSAs. (Note: the content may be consolidated or spread out in different sections of the program).

3. Estimate the training time spent on this course content in a typical delivery.

As you conduct the analysis, you may find that some course content is related to more than one training objective. Other course content may not be associated with any of the objectives listed on the worksheet. Use your best judgement to include in your estimate all course time spent on content related to the objective whether or not this time is also reported for other objectives on the form. Relatively broad time estimates are acceptable.

Don't worry if the sum of the hours you estimate for the training objectives is different from the total you reported in Blocks 3 and 7. The figures will be adjusted later to reflect actual contact or classroom hours.

How Is Student Achievement of the Objectives Demonstrated?

Well-designed performance evaluation techniques provide an useful indicator of each student's ability to achieve the training objectives specified for the course. They also provide a powerful tool for assessing whether the course produces the desired results.

Successful student achievement of training objectives can be demonstrated through various means, including performance on written or skills tests, performance in objective-specific activities individually or as a group, and application of what has been learned in large exercises or in post-course exercise (or subsequently on the job). In this section you are asked to identify which technique or techniques are used to evaluate student learning. To make the determination, compare the course content covered in the evaluation mechanism with that related to the training objective. If they match, check the appropriate box on the form.

Is Objective Adequately Addressed? Comment As Needed

The heart of this assessment process lies in determining whether the training objectives identified in the HMTA Guidelines have been adequately addressed in the course. For purposes of this assessment, an objective is considered adequately addressed when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills, and attitudes required to accomplish the objective safely and effectively during hazardous materials response.

Note that this analysis requires you to make a subjective evaluation of the adequacy of the course materials to support effective training delivery. Take into account the course time spent on the objective and the results of

actual student performance evaluations reviewed previously. Other factors might include the scope of the training covered, methodologies used, clarity of presentation, and level of instructor support. Qualitative factors relating to the art and science of adult training should also be considered. Based on your knowledge of the course, determine whether each objective listed on the worksheet is adequately addressed in the instructional materials. If it would be helpful for other training managers, briefly explain your rationale in the space provided for comments. If the course does not cover a specific learning objective, enter "Not addressed" in the appropriate space.

1997 Planning Course Assessment Worksheet

1 Organization Sponsoring Course	2 Individual to Contact — *Contact for further information regarding the course (name, address, phone).*

3 General Course Description

(A) Course Title _____

_____

(B) Edition Number and/or Date _____ (C) Length (hours) _____

(D) Course Purpose or Goal _____

_____

_____

_____

4 Target Audiences, Competencies, Objectives

See instructions. Check each box if yes. If only selected objectives are addressed, describe. Attach appropriate course assessment worksheets. Continue as needed in Section 10: Special Course Characteristics.

(A) Target Audiences

☐ Course is suitable for all potential participants in community haz mat planning who meet prerequisites.

☐ Course is targeted for specific disciplines.

- ☐ Emergency Mgt
- ☐ Fire
- ☐ Law Enforcement
- ☐ EMS
- ☐ Public Works
- ☐ Private Industry Responders and Planners
- ☐ Private Industry Mgt Officials
- ☐ Public Officials
- ☐ Public Community Members
- ☐ Other _____

(B) Competencies and Objectives Addressed

All Objectives	Selected Objectives	Competencies
☐	☐	Planning Orientation
☐	☐	Planning Essentials
		Planning Specialities
☐	☐	Commodity Flow Study
☐	☐	Hazard Analysis
☐	☐	Capability Assessment
☐	☐	Planning for Protective Actions
☐	☐	Plan Implementation and Maintenance
☐	☐	Facility Planning
☐	☐	Planning for Public Education
☐	☐	Other

Describe Selected Objectives *(below or in Sec. 10)*

_____

_____

_____

_____

☐ **Continued in Section 10?**

5 Course Materials

See instructions. Check each box if yes and indicate quantities as requested. Explain as needed in Section 10: Special Course Characteristics.

(A) Instructional Materials

- ☐ Instructor Guide (_____ pages)
- ☐ Student Manual (_____ pages)
- ☐ Handouts (_____ pages)
- ☐ Slides (_____ number)
- ☐ Overhead Transparencies (_____ number)
- ☐ Videotapes (____) number) (_____ total length in minutes)
- ☐ Slide/tapes (____) number) (_____ total length in minutes)
- ☐ Audiotapes (____) number) (_____ total length in minutes)
- ☐ Computer floppy discs (_____ number) (_____ format(s))
- ☐ Computer CDs (_____ number) (_____ format(s))
- ☐ Other _____

(B) Evaluation Materials

- ☐ Student tests
  - ☐ Pretest ☐ End of units ☐ End of course
- ☐ Delivery Assessment Instruments
  - ☐ End of units ☐ End of course
- ☐ Other _____

(C) Refresher Training Materials

- ☐ Refresher training guidance included
- ☐ Refresher training materials included

If yes, please describe in Sec. 10 Special Course Characteristics

(D) Demonstration Equipment & Supplies

- ☐ Are scenario or community hazard mock-ups (such as table top displays) used in course?
- ☐ Are computerized displays (such as plume modeling or mapping systems) used in course?
- ☐ Are copies of large sheet student materials (such as blueprints, construction plans or community maps) used in course?
- ☐ Other *Please describe any specialized equipment or supplies in Section 10 Special Course Characteristics*

☐ **Continued in Section 10?**

6 Course Delivery Formats

See instructions. Check which formats are used to deliver the course. If format varies by module, note which modules apply to each format. Explain as needed in Section 11: Special Course Delivery Considerations..

Check if yes.

- ☐ Independent study use (no instructor)
- ☐ Field delivery run by centralized office
- ☐ Broadcast or televised delivery
- ☐ Local department/ employer delivery
- ☐ Special facility or fixed-site delivery
- ☐ Other _____

If the course is delivered using more than one format, please explain.

_____

_____

_____

☐ ***Continued in Section 10?***

7 Unit or Module Summary

See instructions. Provide module title, length in hours or fraction, and check instructional methodologies employed. Use Section 12: Continuation, if necessary.

Unit / Module Number	Unit / Module Length (in Hours)	Unit / Module Has Potential For Use As Stand-Alone Training Module	Unit / Module Title	Instructional Methodologies Used In Unit/Module										
				Lecture / Discussion	Audiovisual Presentation	Classroom Activities: Individual Student Work	Classroom Activities: Group Work	Table Top or Simulation Lab Exercise	Field or Community Exercise	Self-Study	Computer-Assisted Instruction	Written Testing: Pre-Test, Unit Tests, Post-test	Completion of Post-Course Project	Other

☐ ***Continued in Section 12?***

8 *Materials From Other Programs Used In This Course*

See instructions. Applies to major sources only. Explain as needed in Section 12: Continuation.

Organization	Title of Program or Course Used	Comment

☐ ***Continued in Section 12?***

9 *Factors Affecting Use of Course by Other Organizations*

See instructions. Check if yes. Explain as needed in Section 11: Special Course Delivery Considerations.

- ☐ Do course materials have to be purchased?
- ☐ Do copyright limitations apply to use of the materials?
- ☐ Are there any special instructor skills or experience requirements?
- ☐ Are there any special facility or equipment requirement that would impede another jurisdiction's use of this course?
- ☐ Are there any special competency requirements or prerequisites for students?
- ☐ Does a train-the-trainer program exist?
- ☐ Are optional activities provided for different disciplines (emergency management, fire, EMS, private sector, etc.)?
- ☐ Are course texts available on computer disc?
- ☐ Are course evaluations available for review?
- ☐ Are summaries of student achievement available for review?
- ☐ Do the majority of the scenarios apply to other locales or geographic regions?

☐ ***Continued in Section 11?***

10 *Special Course Characteristics*

See instructions. Identify special or innovative characteristics of the course which would be of interest to other trainers, such as new activity approaches, new videos, unusual content sequencing, etc. If clarifying entries in other sections, identify which sections.

11 *Special Course Delivery Considerations*

See instructions. Identify training issues, special requirements or challenges not identified elsewhere that would affect another organization using or adapting this course. If clarifying entries in other sections, identify which sections.

12 *Continuation*

See instructions. Use this section to continue comments that exceed space allowed in other sections. For each comment, identify section being continued.

Side 4- Planning Course Assessment Worksheet **1997**

1997 Planning Course Objectives Worksheet

Planning Orientation

Course Title

Organization

Training for competencies at the *Planning Orientation* level may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.
An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
ORIENT-1 *Given a description of potential haz mat risks, explain the purpose and benefits of integrated haz mat emergency planning, and describe roles and participants in the emergency management system.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-2 *Given a jurisdiction or facility with the need to develop an integrated haz mat plan, identify legal requirements impacting the planning process and product.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-3 *Given the assignment to conduct haz mate emergency planning, identify the scope and elements of an integrated haz mat emergency plan.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-4 *Given the assignment to conduct hazardous materials emergency planning, identify and describe the major steps, participants, and other resources needed in the planning process.*	Time								Check if objective is adequately addressed. ☐ Comment
ORIENT-5 *Given an assignment to participate in or support integrated hazardous materials planning, develop strategies for promoting planning.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997 Planning Orientation**

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1997 Planning Course Objectives Worksheet

Planning Essentials

Course Title

Organization

Training for competencies at the *Planning Essentials* level may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information.
An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
ESSN-1 *Given an assignment ..., describe an appropriate planning strategy and identify team member responsibilities in the process.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-2 *Given a review of pertinent information sources and data collection methods, demonstrate the ability to identify, acquire and summarize background information related to individual organizational and/or functional area(s) of responsibility that will impact the team planning process.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-3 *Given an assignment ..., identify and describe the purpose, benefits, major steps, and participant's role in Hazards Analysis & Capability Assessmt*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-4 *Given an assignment ..., demonstrate the ability to identify, collect, review and interpret the Hazards Analysis & Capability Assessment data.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-5 *Given .... the results of research and input from other planning team members, describe the issues and solutions to be addressed in the plan and identify needed assignments for developing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Planning Essentials (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
ESSN-6 *Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating the Integrated Hazardous Materials Emergency Plan, to address preparedness, response and short term recovery.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-7 *Given identified issues and solutions to be addressed in the plan and assignments to planning team members, demonstrate the ability to participate in developing or updating a comprehensive prevention/mitigation section in the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-8 *Given a completed draft hazardous materials plan, demonstrate the ability to participate in the plan review and appraisal process.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-9 *Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for implementing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
ESSN-10 *Given a completed hazardous materials plan, describe an appropriate strategy and identify methods for evaluating and maintaining the plan.* **END**	Time								Check if objective is adequately addressed. ☐ Comment

Planning Course Objectives Worksheet - **1997 Planning Essentials**

1997 Planning Course Objectives Worksheet

Planning Specialities: Commodity Flow Study

Course Title

Organization

Training for competencies for the planning speciality area *Commodity Flow Study* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
CFS-1 *Given a jurisdiction with the need to develop an integrated haz mat emergency plan, describe the purpose and benefits of conducting a commodity flow study, including applications of the results in planning.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-2 *Given an assignment to conduct a commodity flow study for a jurisdiction, identify major steps in the process.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-3 *Given an assignment to conduct a commodity flow study for a jurisdiction, identify the specific purpose(s) of the study.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-4 *Given the specific purpose(s) of a commodity flow study for a jurisdiction, demonstrate the ability to identify and review existing baseline information appropriate to the study.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-5 *Given the specific purpose(s) and baseline data of a commodity flow study for a jurisdiction, demonstrate the ability to design a field investigation appropriate to the study.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Planning Specialities: Commodity Flow Study (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
CFS-6 *Given an area to be surveyed and the commodity flow study design for a jurisdiction, demonstrate the ability to implement common data collection methods.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-7 *Given hazardous materials transportation data for a jurisdiction, demonstrate the ability to apply appropriate sampling techniques to the collection and interpretation of the data.*	Time								Check if objective is adequately addressed. ☐ Comment
CFS-8 *Given hazardous materials transportation data and analyses for a jurisdiction, demonstrate the ability to apply the results in planning.* **END**	Time								Check if objective is adequately addressed. ☐ Comment

Planning Course Objectives Worksheet - **1997**
Planning Specialties: Commodity Flow Study

1997 Planning Course Objectives Worksheet

Planning Specialities: Hazard Analysis

Course Title

Organization

Training for competencies for the planning speciality area *Hazard Analysis* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
HAZAN-1 *Given an assignment to conduct a hazards analysis for a jurisdiction or facility, describe the process to be used for conducting the study.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-2 *Given an assignment to conduct a hazards analysis for a jurisdiction or facility, demonstrate the ability to identify hazards and situations that pose a serious threat in the planning area.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-3 *Given the results of the hazard identification, demonstrate the ability to analyze and map the vulnerability of people, property, business interests, and environments in the planning area.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-4 *Given a hazard identification and vulnerability analysis for a community or facility, demonstrate the ability to assess the risk of injury or damage due to a hazardous materials release in the planning area.*	Time								Check if objective is adequately addressed. ☐ Comment
HAZAN-5 *Given the hazard identification, vulnerability analysis, and risk assessment for a community or facility, demonstrate the ability to prepare a comprehensive hazard analysis report.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997 Planning Specialties: Hazard Analysis**

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1997 Planning Course Objectives Worksheet

Planning Specialities: Capability Assessment

Course Title

Organization

Training for competencies for the planning speciality area *Capability Assessment* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
CAP-1 *Given an assignment to conduct a capability assessment for a jurisdiction or facility, describe the process to be used for conducting the study.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-2 *Given the process to be used for conducting a capability assessment for a jurisdiction or facility, assess the adequacy of existing resources to support preparedness, prevention/ mitigation, response, and short-term recovery activities.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-3 *Given haz mate plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prepare for, respond to, and recover from worst-case incidents identified in the hazard analysis.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-4 *Given haz mat plans and SOPs, a completed hazard analysis, an evaluation of existing resources, critiques of incidents, exercises, and drills, and other pertinent information, demonstrate the ability to assess the jurisdiction's or facility's capability to prevent or mitigate the effects of identified risks.*	Time								Check if objective is adequately addressed. ☐ Comment
CAP-5 *Given the results of the capability assessment analysis, prepare a comprehensive written report.* **END**	Time								Check if objective is adequately addressed. ☐ Comment

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1997 Planning Course Objectives Worksheet

Planning Specialities: Protective Actions

Course Title

Organization

Training for competencies for the planning speciality area *Protective Actions may* be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
EVAC-1 *Given a hazards analysis and capability assessment, demo the ability to develop decision-making criteria for implementing protective actions.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-2 *Given the assignment to plan for protective actions for a jurisdiction or facility, demo the ability to assess existing systems, strategies, and procedures for notifying... ..and informing the public about prot. action decisions.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-3 *Given a hazard analysis and capability assessment, demo the ability to assess existing systems, strategies, and procedures for evacuating populations at risk in a haz mat incident.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-4 *Given a hazards analysis and capability assessment , demo the ability to assess existing systems, strategies, and procedures for impl. in-place sheltering and other protective actions in a hazmat incident.*	Time								Check if objective is adequately addressed. ☐ Comment
EVAC-5 *Given an assessment of the jurisdiction's or facility's capabilities to implement protective action options in haz mat incidents, demonstrate the ability to develop related emergency plans & procedures.*	Time								Check if objective is adequately addressed. ☐ Comment

END

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1997 Planning Course Objectives Worksheet

Planning Specialities: Plan Implementation and Maintenance

Course Title

Organization

Training for competencies for the planning speciality area *Plan Implementation and Maintenance* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
PI&M-1 *Given the goals and objectives of the integrated hazardous materials planning process for a jurisdiction or facility, develop a strategy for plan implementation.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-2 *Given a completed integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure proper promulgation and dissemination of the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-3 *Given an approved integrated hazardous materials plan for a jurisdiction or facility, develop strategies to ensure coordination with multi-jurisdictional planning efforts.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-4 *Given an approved integrated haz mat plan for a jurisdiction or facility, develop strategies to ensure that organizations and personnel are capable of carrying out their assigned responsibilities.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-5 *Given implementation of an approved integrated haz mat plan for a jurisdiction or facility, develop strategies for monitoring changes and trends that impact the plan or planning process.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

1997 Planning Course Objectives Worksheet

Planning Specialities: Plan Implementation and Maintenance (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
PI&M-6 *Given implementation of an approved integrated hazardous materials plan for a jurisdiction or facility, participate in the design and development of an exercise program that is useful for evaluating and updating the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
PI&M-7 *Given changes and trends that impact the plan or planning process, incident critiques, exercise results, expert opinion, and other information, develop strategies for conducting periodic reviews and updates of the plan.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997**
Planning Specialties: Plan Implementation and Maintenance

1997 Planning Course Objectives Worksheet

Planning Specialities: Facility Planning

Course Title

Organization

Training for competencies for the planning speciality area *Facility Planning* may be assessed using the recommended objectives displayed below. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
FACIL-1 *Given an assignment as a facility planning team member, describe an appropriate planning strategy and team member responsibilities in the process.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-2 *Given an assignment as a facility planning team member, demo the ability to conduct a review of federal, state, and local authorities applicable to the planning process.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-3 *Given an assignment as a facility planning team member, demonstrate the ability to conduct background research appropriate to the planning requirement.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-4 *Given the planning process to be used by the facility, identify the purpose, benefits, methods, expected results, and participant roles in hazards analysis and capability assessment.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-5 *Given the facility's production processes and potential hazards, demonstrate the ability to identify, collect, and interpret hazards analysis and capability assessment data needed for planning.*	Time								Check if objective is adequately addressed. ☐ Comment

Continue On Next Page

Planning Specialities: Facility Planning (continued)

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
FACIL-6 *Given the results of the facility's hazards analysis and capability assessment, demonstrate the ability to identify issues and solutions to be addressed in the plan, and assignments for developing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-7 *Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating the hazardous materials emergency operations plan, to address preparedness, response and short-term recovery.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-8 *Given identified issues and solutions to be addressed in the facility plan, participate as assigned in developing or updating a comprehensive prevention/mitigation section in the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-9 *Given a draft facility hazardous materials plan, participate as assigned in the plan review and appraisal process.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-10 *Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for implementing the plan.*	Time								Check if objective is adequately addressed. ☐ Comment
FACIL-11 *Given an approved hazardous materials facility plan, describe appropriate strategies and identify methods for evaluating and maintaining the plan.*	Time								Check if objective is adequately addressed. ☐ Comment

END

Planning Course Objectives Worksheet - **1997**
Planning Specialties: Facility Planning

1997 Planning Course Objectives Worksheet

Planning Specialities: Planning for Public Education

Course Title

Organization

Training for the portion of the planning speciality area *Planning for Public Education* related to educating the public may be assessed using the recommended objectives displayed below. Additional objectives are being prepared for other portions of this specialty area and will be added at a later time. Only principle objectives are used in course assessment. Accomplishment of appropriate enabling objectives is assumed, given student achievement of the principle objective. See *Guidelines for Public Sector Hazardous Materials Training* for additional information. An objective is considered "adequately addressed" when it is judged that the course materials and instructional methodology are sufficient to provide students with the knowledge, skills and attitudes needed to accomplish the objective effectively on the job. Refer to the accompanying Planning Course Assessment Instructions for directions on how to use this worksheet.

Recommended Objective	Course Time Spent On Objective (Hours)	How Is Student Achievement Of The Objective Demonstrated?							Is The Recommended Objective Adequately Addressed? Comment As Needed.
		Individual Activity	Group Activity	Course Exercise	Written Test	PostCourse Project	Other	None	
EDUC-1 *Given residency in a specific jurisdiction, identify the purpose, benefits, and components of the jurisdiction's hazardous materials emergency management system.*	Time								Check if objective is adequately addressed. ☐ Comment
EDUC-2 *Given residency in a specific jurisdiction, describe the citizen's role in the jurisdiction's hazardous materials emergency management system.*	Time								Check if objective is adequately addressed. ☐ Comment
EDUC-3 *Given residency in a specific jurisdiction, identify personal actions to promote hazardous materials emergency management.*	Time								Check if objective is adequately addressed. ☐ Comment

END

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Credits

The *Guidelines for Hazardous Materials Public Sector Training* is a component of the Hazardous Materials Emergency Preparedness (HMEP) Grants Program, administered by the Department of Transportation (DOT). This work represents the efforts of many professionals in the federal, State, tribal, local and professional association hazardous materials communities over the last several years. The work has been accomplished under the overall leadership of the managers and supervisors of DOT, Research and Special Programs Administration, and the Federal Emergency Management Agency (FEMA), Preparedness, Training and Exercises Directorate, Training Division. Individual contributors have been grouped into the following categories: project coordination federal staff, 1997 edition authors, 1997 edition reviewers, 1994 edition authors, 1994 edition reviewers:

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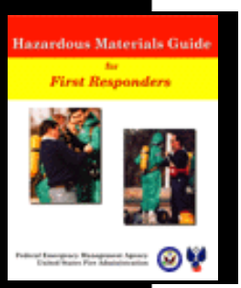

USFA Hazardous Materials Guide for First Responders
About This Guide

Objectives

This book is the result of an extensive study of available hazardous materials response resources for first responders undertaken by the United States Fire Administration (USFA) as part of the Firefighters' Safety Study Act of 1990 (P.L. 101-446). The study concluded that, while several excellent and technically accurate resources are available, none are directed to the specific needs of the first responder trained at the Awareness or Operational Levels of Training; the training levels of most first responders. It is the hope and the intent of the USFA that this book will be that much needed resource.

This book provides important information for the initial response to both transportation and fixed facility incidents. It has been designed to present the first responder with a maximum amount of useful key information in a limited amount of space. As with any reference, it cannot include all information that might be useful or discuss all situations which might occur; nor can it replace the training and experience of individual responders. The information contained in this book has been reviewed by several sources and is as technically accurate as possible. For major incidents it will be necessary to obtain more detailed information from other resources as well as more advanced expertise from those with more extensive training.

It is assumed that those using this book will have had some training in hazardous materials response. Because most first responders are trained at the Awareness or Operational levels, this book is directed at appropriate responses for these levels of training. These levels are defined below as published by the National Fire Protection Association (NFPA 472, 1992) and the Occupational Safety and Health Administration (OSHA 1910.120).

OSHA 1910.120

FIRST RESPONDER AT AWARENESS LEVEL: First responders at the **Awareness Level** are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the authorities of the release. First responders at the **Awareness Level** shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

A. An understanding of what hazardous substances are, and the risks associated with them in an incident.
B. An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
C. The ability to recognize the presence of hazardous substances in an emergency.
D. The ability to identify the hazardous substances, if possible.
E. An understanding of the role of the first responder awareness individual in the employers emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.
F. The ability to realize the need for additional resources, and to make appropriate notifications to the communication center.

FIRST RESPONDER OPERATIONS LEVEL: First responders at the **Operations Level** are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the **Operations Level** shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the

following areas in addition to those listed for the **Awareness Level** and the employer shall so certify:

A. Knowledge of the basic hazard and risk assessment techniques.
B. Know how to select and use proper personal protective equipment provided to the first responder operational level.
C. An understanding of basic hazardous materials terms.
D. Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
E. Know how to implement basic decontamination procedures.
F. An understanding of the relevant standard operating procedures and termination procedures.

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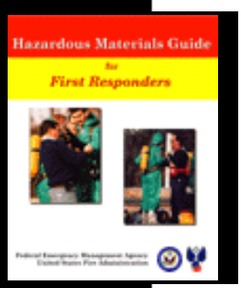

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How the Book is Organized

The body of this book is divided into seven sections:

- Indexes: Alphabetical Material Name Index followed by a UN/NA Number Index.
- Specific Material Guides: specific recommendations for 430 commonly encountered materials.
- Materials Summary Response Table: summary information for 1,422 less commonly encountered materials.
- DOT Placards - Chart 10.
- Silhouettes of Rail Cars, Tank Trucks and Chemical Tanks.
- General Approach to a Hazmat Incident.
- Glossary of Terms and Abbreviations used in the book.

The main body of the book provides information on about 1750 different materials. The materials included in these sections include most of those which have been reported to have been involved in hazardous materials incidents. Most drugs have been excluded. Materials were assigned to the Specific Material Guide section or the Materials Summary Response Table based upon the likelihood that they would be encountered and the magnitude of the hazards they represent, using a formula designed for this project. The information in these two sections is intended to be used during an actual incident.

The General Approach to a Hazmat Incident section provides specific information about a number of different response scenarios. It also provides useful information and techniques for assisting in the identification of materials. This section should be studied as part of training for Hazmat response. It is not intended for use during an actual incident.

Following the General Approach section is a Glossary of the technical terms and abbreviations used throughout the book. While the authors have tried to use simple and straightforward language, some terms may not be familiar to all users. Also included in this last section are several Appendices providing reference information mentioned in the text.

This book has been extensively indexed using all of the material names and synonyms (other names for the same chemical) found in the book. There is a separate index for UN and NA numbers which are commonly found on shipping papers when materials are in transport. While the Specific Material Guides section is arranged in alphabetical order by the most widely used name of the material, the index should be used as the most rapid way of locating information about a specific material.

This book does not contain specific recommendations about isolation or evacuation distances. Because this book is designed to be used in a wide range of scenarios involving different container sizes, it was felt that the calculation of such distances could be misleading and perhaps dangerous. Isolation distances are best determined by those trained above the operations level, taking into account the amount of material involved, the weather conditions and the specific circumstances of the release.

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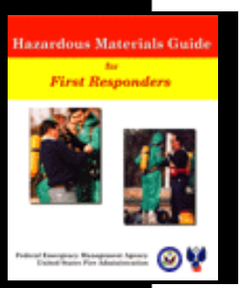

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How to Use the Specific Material Guide (Chemical-specific) Pages

The Specific Material Guides (RED TAB) provides detailed response information for 430 materials. These materials were systematically selected based on their likelihood of being encountered and the magnitude of the hazard they pose to the first responder. An example of a specific material guide is shown in Figure 1.

The most widely accepted chemical name for the material is found in the top center of each page. Underneath the primary name is the UN (United Nations) number or the NA (North American) number. The UN number is commonly used for materials in commerce and can be found on shipping papers. A few materials in this section do not have an assigned UN number. This may mean either that the material is not considered a hazard, or that it is not found in transport in a sizeable amount. The shipping name of the material appears directly under the chemical name. Finally, other less commonly used names for the material are listed.

In the upper right hand corner of the page are the DOT placard(s)/label(s) assigned to the material when transported within the United States. A complete list of current DOT placards is found in Chart 10 on page 521. For a few materials, no specific DOT placard designation has been made in 49CFR and this area is left blank.

In the upper left corner of the page is the NFPA 704 placard providing summary information on acute health, fire and reactivity hazards plus any special concerns such as water reactivity which apply to the material. An explanation of the number designations used in the NFPA placard taken from NFPA 704 is found on page 550. The placard is commonly found on storage containers or is posted at fixed facilities. When posted on fixed facilities each designation represents the worst hazard in that category within the building or facility. The placard is not found on materials in transport.

NFPA 704 designations were taken, when available, from the 1994 editions of NFPA 49 and NFPA 325. If the material was not rated in these references, values were determined and assigned from published data, where available, or were based on reasonable estimation from data published on structurally similar materials, using the definitions for these designations from NFPA 49. If the information in the placard is from the NFPA 49 or NFPA 325, the designation "NFPA" appears along the right edge of the placard. If there is no such designation, the content of the NFPA 704 placard was determined by the authors.

Below the list of synonyms may appear a section printed in red entitled WARNING. This section is vitally important. It provides crucial information about hazards that are **immediately life threatening** to the first responder. A WARNING indicates a very dangerous material because of the health risk or because of the extreme fire, explosion or reactivity risk(s). Most materials will not have a WARNING section. This does not mean that they are not dangerous and cannot injure or kill, only that they are not likely to do so if they are handled properly.

Below the WARNING section is a section entitled HAZARDS. This section describes the physical, chemical, or toxic properties of the material which create risks for the first responder. This section includes such things as explosion hazard, flammability risk and acute health hazards. Hazards are arranged in the approximate order of their importance to the first responder.

Next to the HAZARDS is a section entitled DESCRIPTION. This section describes what the material looks and smells like, along with some important information about the physical properties of the material, such as whether it floats or sinks in water or whether it is heavier or lighter than air (if it is a gas). The information in this section may be useful in

verifying the identity of a hazardous material and in anticipating some of its actions.

In the middle of the page are sections entitled AWARENESS AND OPERATIONAL LEVEL TRAINING RESPONSE and OPERATIONAL LEVEL TRAINING RESPONSE. These sections list the appropriate actions for the first responder trained to each of these two levels of expertise. Not all of the statements listed may be appropriate for every situation, but actions should not be more aggressive than those listed. The most important recommendations are given first. Remember that these are initial recommendations for the first responder. They may be modified by the on-scene Hazmat Incident Commander. Awareness Level Response actions are all defensive in nature. Operational Level Response actions are divided into two general situations, those involving releases of material without an accompanying fire and those where a fire is involved, whether or not the material itself is burning. Operational Level Responders must remember that actions listed under Awareness and Operational Level Response should be completed *before* beginning the more definitive Operational Level Response actions.

At the bottom of the page is a FIRST AID section. These recommendations should be used in caring for victims who are out of the Hot zone. Rescue of victims from within a Hot zone should only be performed by trained personnel wearing appropriate chemical resistant gear and is not generally a first responder action.

Removal of hazardous material from the skin, eyes or clothing of a victim (decontamination) is usually the most important first aid action that can be initiated. It should be performed only by appropriately trained and equipped individuals. Rapid removal of the material may be the difference between a minor injury and a serious injury. The details of decontamination techniques are beyond the scope of this book. In general, using large quantities of water to rinse off materials is almost always the first choice for decontamination in the field. Materials which are so toxic that first aid should not be performed on contaminated victims because of the risk of serious injury to the responder are clearly labeled. There are very few antidotes for treating victims exposed to chemicals and they are listed in this section for the benefit of hospital personnel who may care for these victims. Other First Aid information is also provided.

Finally, at the middle of the page below the first aid section is a CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER (CAS: _ _ _-_ _-_). This is a specific identifying number given to each chemical by the Chemical Abstract Service. Mixtures are usually not assigned CAS numbers. While not commonly used in shipping, the CAS number may be found on containers and Material Safety Data Sheets (MSDS) and is used by many more detailed references as an indexing number. It is provided as another positive identifier and to allow quick reference to other data bases.

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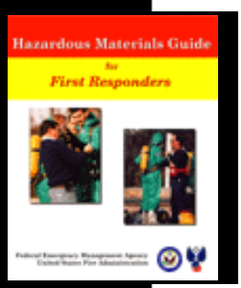

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How to Use the Materials Summary Response Table

The Materials Summary Response Table (YELLOW TAB) provides summary information on 1,422 additional materials. These materials are either less likely to be encountered by the first responder. This table is arranged in alphabetic order using the most common chemical name of the material. For each material the UN number and DOT placard designation are provided, if available. NFPA designations are provided for all materials. In the case where NFPA designations were not available from NFPA 49 or 325, values were assigned by the authors using NFPA 49 definitions along with available data on the material or on structurally similar materials. NFPA 704 designations taken from NFPA sources are shown in green while the those assigned by the authors are in black.

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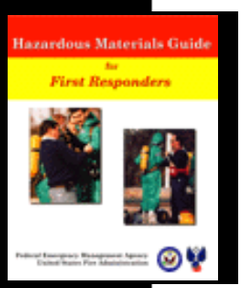

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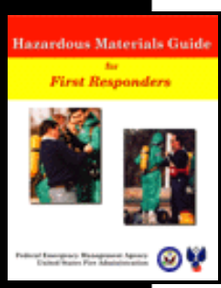

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Acknowledgments

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Last Updated: April 6, 1999

HYDROGEN CYANIDE

(STABILIZED)

UN 1051

Shipping Name: Hydrogen cyanide, stabilized with less than 3 percent water

Other Names: AC — Hydrocyanic acid solution
HCN — Prussic acid
Hydrocyanic acid

WARNING!
- POISON! BREATHING THE VAPORS OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- May react with itself without warning with explosive violence
- Container may BLEVE or explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Vapors are slightly lighter than air but will collect and stay in low areas
- Combustion products are less toxic than the material itself

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid that boils at 78˚ F
- Sweet odor like bitter almonds; many people cannot smell it
- Dissolves slowly in water but is soluble in water
- Extremely flammable
- Vapors are slightly lighter than air but will collect and stay in low areas
- Transported in red and white candy striped containers
- Produces large amounts of vapor
- Freezes at 8˚ F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH; combustion products are less toxic then the original material. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 74-90-8

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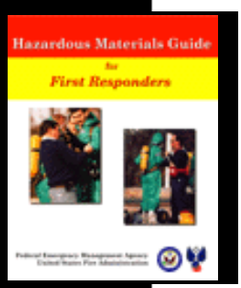


Firefighters' Safety Study Act (P.L. 101-446)

Report on the Status of Activities
October 1998

Federal Emergency Management Agency
United States Fire Administration

Status of the Firefighter Safety Study

The goal of this study is to improve the accuracy and usefulness of response guidance so that safer and more effective responses to hazardous materials incidents can be conducted. The results of this study are to be reported to Congress, and recommendations of the report are to be reviewed annually. This report is the seventh annual report on the status of the Firefighter Safety Study.

Background

Public Law 101-446, the Firefighter Safety Study Act of 1990, directs the Administrator of the United States Fire Administration to consult and coordinate a review of information available to first responders with government agencies, private sector firms, and first responders. The goal of these efforts is to improve the accuracy and suitability of response guidance so that safer and more effective responses to hazardous materials incidents can be conducted at the State and local level. The Study has been approached in three phases that follow in detail.

Phase One - Under the first phase of the study, the Administrator established three committees which worked together to perform this review. These committees were the:

Coordinating Committee - composed of representatives of Federal agencies, State and local officials, and the chemical industry who developed or had the responsibility for the maintenance of guidance used by first responders;

Technical Committee - composed of technical representatives from Federal agencies, industry, and local government to determine what constituted vital and accurate information; and

Field Applications Committee - composed of fire and emergency service personnel who are themselves users of response guidance in emergency situations.

The report of the Working Group of the Firefighter Safety Act, *Firefighter Safety Study: Review of Adequacy of Response Information on Hazardous Material*, submitted to the Congress in October of 1992, determined that the currently available information was generally accurate and the response network was sufficient in most cases. The working committees, however, concluded that one response guide should be available to first responders since they generally do not have the time to consult multiple sources. Moreover, the working committees recommended an improved format for this response guide.

The working committees acknowledged the effort that a new format would entail. Nonetheless, the committees felt that the opportunity to tailor a guide to the special needs of the first responder would have substantial benefits.

Phase 2 - In the second phase of the study, a sub-group of the three Firefighter Safety Committees was formed to specifically address the improved response guide recommendation. This sub-group, designated as the Project Committee of the Firefighter Safety Study, consists of the principal members of the Technical and Field Applications Committee. The Fire Administration also entered into a cooperative agreement with the University of Louisville to develop, under the direction of the Project Committee, a

prototype document based on the recommendations of the preliminary report. Louisiana State University was separately retained to review the prototype document for technical accuracy and the suitability of the response level.

The Project Committee devised a format style that incorporates the recommendations from the preliminary report of the Firefighter Safety Study. In addition, the committee has identified the major sections of the prototype document that are appropriate for the first responder.

Phase 3 - The final phase in the Firefighter Safety Study was the formal test and evaluation of a prototype *Hazardous Materials Guide for First Responders*.

Status of Actions

Since the last status report in 1997, the Project Committee completed changes to the draft as a result of comments from participants in the field evaluation. Changes to the draft were also made based on comments from the U.S. Department of Transportation's Office of Hazardous Materials Safety.

Printing and Distribution

The USFA has entered into an interagency agreement with the U.S. Department of Commerce, National Technical Information Service (NTIS) for the printing and distribution of the Guide. The agreement calls for NTIS to print and stock the document for sale to the public. Availability of the publication will be promoted through the FEMA/USFA and NTIS web sites, in addition to press releases and special notices to fire service organizations throughout the United States.

The agreement with NTIS will also provide the USFA with over 4,000 copies of the Hazardous Materials Guide which will be distributed to public safety dispatch centers at no cost to those centers. This will permit those agencies that cannot afford to purchase a guide for each emergency response vehicle to have at least one copy available in their communications center for reference by dispatchers who can then relay critical information to the scene by radio.

Electronic Distribution

In addition to a printed version, USFA staff began work on an application to make the guide accessible via the World Wide Web at http://www.usfa.fema.gov. When complete, the user will be able to view any portion of the document on-line, or download the document for printing. The Web based version is expected to be on line by the end of October 1998.

A version of the Guide is also being developed for CD-ROM. The CD-ROM version will also be duplicated and distributed through NTIS.

Update and Maintenance of Guide

Periodic updates of the guide will be necessary due to the nature of the information. It will be necessary to add or remove chemicals, and update guidance as new information or methods for handling materials become available. The Project Committee recommended updating the guide on a four-year cycle.

Prior to the publication of each new edition, USFA staff will solicit input for improvements to the guide through a variety of sources. Those sources would include, but not be limited to the following:

- Public announcements through the Federal Register;
- Notices posted on the FEMA/USFA Web Site;
- Notices sent to major publications aimed at First Responders from the fire, police, and emergency medical services community;
- Notices to the chemical industry

Once the comment period has ended, USFA staff will meet with the Project and Coordinating Committees and review each comment to make the necessary changes for each new edition.

VINYLTRICHLOROSILANE

UN 1305

Shipping Name: Vinyltrichlorosilane
Other Names: A-150
Trichloroethyenylsilane
Trichlorovinylsilicon
Vinylsilicon trichloride

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY TO FORM TOXIC HYDROGEN CHLORIDE AND HYDROCHLORIC ACID!

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Upon contact with moisture reacts with metals to produce hydrogen gas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the area downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to pale yellow fuming liquid
- Sharp choking odor like hydrochloric acid
- Sinks in water and reacts with water to form hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and run from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-94-5

USFA
16825 S. Seton Ave.
Emmitsburg, MD
21727
(301) 447-1000

USFA Home Banner Image

Working for a Fire-Safe America

As an entity of the Federal Emergency Management Agency, the mission of the USFA is to reduce life and economic losses due to fire and related emergencies, through leadership, advocacy, coordination, and support. Learn More

Support for Fallen Heroes of Our National Tragedy

FEMA Responds

Complete Coverage of Attack and Recovery

New York **Pentagon** **Photo Library**

What's New

September 29, 19101

President Bush to Honor Nation's Fallen Firefighters

EMMITSBURG. Md. -- President George W. Bush will lead the nation in paying tribute to the firefighters who died in the line of duty last year. Mrs. Bush will join him at the 20th annual National Fallen Firefighters Memorial service on October 7, at the National Fire Academy in Emmitsburg, MD.

USFA Critical Infrastructure Protection Center (CIPC) InfoGram

Topics addressed in this week's InfoGram are critical infrastructure vulnerabilities, emergency services infrastructure, the Critical Infrastructure Information Security Act, terrorism preparedness planning, and the new "Vote Virus."

FEMA Awards $9.4 Million in Fire Grants in Tenth Round

WASHINGTON -- September 24 - The Federal Emergency Management Agency (FEMA) announced today that 158 fire departments across the United States would receive $9.4 million in grants in the tenth round of awards under the Assistance to Firefighters Program.

Other News

- President Announces Intent to Nominate U.S. Fire Administrator
- NFA Cancels Remaining September Classes
- FEMA Awards $10.5 Million in Fire Act Grants in Ninth Round
- CIPC InfoGram: Impact of Terrorist Attacks on Our Nation's Critical Infrastructures
- FEMA Awards $5 Million in Fire Grants in Eighth Round
- FEMA Awards More Than $600,000 in Special Fire Act Grants
- Fire in the United States 1989-1998
- Fourth Annual F.R.E.S.H. Wellness Symposium

USFA Spotlight On

- Prevent Fire. Save Lives. Public Education Campaign
- After the Fire: Returning to Normal
- Firefighter Fatalities in the U.S. in 2000
- Firefighters Memorial Service
- Topical Fire Research Series
- Federal Surplus Property Programs
- Blue Ribbon Panel Report
- USFA Action Plan
- America Burning Recommissioned (America at Risk)
- NFIRS Support Center
- Fire Risks for Older Adults
- Funding Alternatives

Help USFA Build a Better Web Site

ALLYL ALCOHOL

UN 1098

Shipping Name: Allyl Alcohol

Other Names: AA, Allyl al, Allylic alcohol, Orvinylecarbinol, 2-Propenol, Propenol, Propenyl alcohol, Vinylcarbinol

WARNING!
- POISON! BREATHING THE VAPORS OR SKIN CONTACT CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Highly flammable
- Container may BLEVE when exposed to fire
- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Clear, colorless liquid
- Pungent, mustard-like smell
- Initally floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors and dilute standing pools of water
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-18-6

HYDROGEN CYANIDE

(STABILIZED)

UN 1051

Shipping Name: Hydrogen cyanide, stabilized with less than 3 percent water

Other Names: AC, Hydrocyanic acid solution, HCN, Prussic acid, Hydrocyanic acid

WARNING!
- POISON! BREATHING THE VAPORS OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- May react with itself without warning with explosive violence
- Container may BLEVE or explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Vapors are slightly lighter than air but will collect and stay in low areas
- Combustion products are less toxic than the material itself

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid that boils at 78° F
- Sweet odor like bitter almonds; many people cannot smell it
- Dissolves slowly in water but is soluble in water
- Extremely flammable
- Vapors are slightly lighter than air but will collect and stay in low areas
- Transported in red and white candy striped containers
- Produces large amounts of vapor
- Freezes at 8° F

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH; combustion products are less toxic then the original material. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 74-90-8

ACETALDEHYDE

UN 1089

Shipping Name: Acetaldehyde
Other Names: Acetic aldehyde
Ethanal
Ethylaldehyde

WARNING!
- EXTREMELY FLAMMABLE!
- MAY EXPLODE WITHOUT WARNING WHEN EXPOSED TO HEAT, DUST OR CORROSIVE OR OXIDIZING AGENTS!

Hazards:

- Very irritating to skin and eyes, prolonged contact can cause burns
- Container may BLEVE when exposed to fire
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent fruity odor
- Soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors

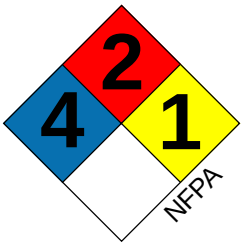
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support /CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns rinse with water and apply a clean dry dressing

CAS: 75-07-0



LACTONITRILE

UN 3275

Shipping Name: Nitriles, toxic, flammable, n.o.s.
Other Names: Acetaldehyde cyanohydrin
Hydroxypropinonitrile
Acetocyanohydrin
2-Hydroxypropinonitrile

WARNING! • POISON! SKIN CONTACT, BREATHING THE VAPORS OR SWALLOWING THE LIQUID CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
• Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion products include toxic cyanide gas
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

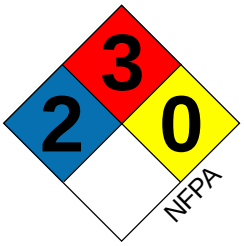
Description:
- Colorless to straw colored liquid
- No odor found
- Initially floats on water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 78-97-7



ACETAL

UN 1088

Shipping Name: Acetal
Other Names: Acetaldehyde ethylacetal
Acetol
1,1-Diethoxyethane

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent, woody odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

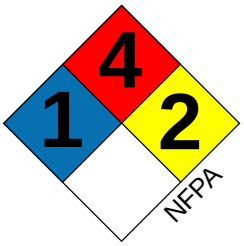
First Aid:

- Provide Basic Life Support /CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns rinse with water and apply a clean dry dressing

CAS: 105-57-7

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Acetamide			0	1	0	
Acetone thiosemicarbazide			2	1	0	
Acetophenone			**1**	**2**	**0**	
2-Acetylaminofluorene			1	1	0	
Acetyl peroxide solution	2084		**1**	**2**	**4**	
Acridine	2713	Poison	2	2	0	
Agent T			4	1	0	
Adipic acid			**1**	**1**	**0**	
Alachlor			2	0	0	
Aldrin	2761	Poison	4	0	0	
Alkyl benzene sulfonic acids			2	1	0	
Allene	2200	Flammable gas	2	4	3	
Allethrin	2902	Poison	1	1	0	
Allyl acetate	2333	Flammable	**1**	**3**	**0**	
Allyl ether			**3**	**3**	**2**	
Allyl ethyl ether	2335	Flammable	2	4	4	
Allyl iodide	1723	Flammable	2	3	2	
Allyl isothiocyanate	1545	Poison	**3**	**2**	**0**	
Aluminum (dust)	1396	Flammable solid	0	3	1	
Aluminum borohydride	2870	Spontaneously combustible	2	4	0	
Aluminum chloride	1726	Corrosive	**3**	**0**	**2**	**W**
Aluminum fluoride			3	0	0	
Aluminum nitrate	1438	Oxidizer	2	0	1	OX
Aluminum oxide			0	0	0	
Aluminum phosphide	1397	Dangerous when wet	**4**	**4**	**2**	**W**
Aluminum sulfate			0	0	0	
4-Aminoazobenzene			2	1	0	
4-Aminobutyl diethoxymethyl silane			3	2	2	
2-(2-Aminoethoxy)ethanol	3055	Corrosive	1	1	0	
Aminoethyl ethanol amine			**2**	**1**	**0**	
N-aminoethyl piperazine	2815	Corrosive	2	2	0	
2-Amino-2-methyl-1-propanol			2	2	0	
4-Aminopropiophenone			2	2	0	
Amiton	3017		4	2	1	
Amiton oxalate			4	2	1	
Amitrole			1	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



ETHYLENE

UN 1038 (Cryogenic liquid)
UN 1962 (Compressed gas)

Shipping Names: UN 1962 Ethylene, compressed
UN 1038 Ethylene, refrigerated liquid (cryogenic liquid)

Other Names: Acetene Ethene
Etherin

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Containers may BLEVE or explode when exposed to fire
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Cold gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas which may appear white
- Shipped and stored as a gas, a liquefied compressed gas or a cryogenic liquid
- Faint slightly sweet odor
- Liquefied gas floats and boils on water
- Extremely flammable
- Cold gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely
- Use large amounts of water well away from the release to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

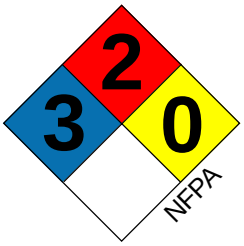
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-85-1



ACETIC ACID

UN 2789 (More than 80%)
UN 2790 (Solution in water 1-80%)

Shipping Name: UN 2789 Acetic acid, glacial
UN 2790 Acetic Acid, solution, more than 10% but not more than 80% acid.

Other Names: Ethanoic acid, Glacial acetic acid, Ethylic acid, Methane carboxylic acid

Hazards:
- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Will attack many forms of rubber or plastic

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sour, pungent odor like vinegar
- Soluble in water and produces heat when mixed with water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

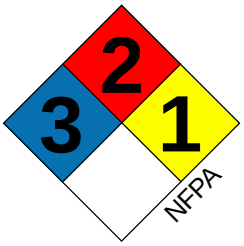
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns rinse with water and apply a clean dry dressing

CAS: 64-19-7



ACETIC ANHYDRIDE

UN 1715

Shipping Name: Acetic Anhydride
Other Names: Acetic acid anhydride
Acetyl anhydride
Acetyl ether
Acetyl oxide
Ethanoic anhydride

Hazards:

- Vapors and liquid are extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Reacts explosively with a large number of chemicals

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Strong vinegar-like smell
- Dissolves in water and reacts with water to form acetic acid (vinegar) and heat
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Use alcohol foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns rinse with water and apply a clean dry dressing

CAS: 108-24-7

ACETYL BROMIDE

UN 1716

Shipping Name: Acetyl Bromide
Other Names: Acetic acid bromide
Ethanoyl bromide

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROGEN BROMIDE GAS!

Hazards:
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic and corrosive hydrogen bromide

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sharp, unpleasant acrid smell
- Sinks in water and reacts violently with water to produce acetic acid and toxic and corrosive hydrogen bromide
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Attacks and corrodes wood and most metals in the presence of moisture

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Do not allow water to come in contact with the material; if material is on fire, use dry chemical to extinguish. If water must be used, use in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 506-96-7

ACETYL CHLORIDE

UN 1717

Shipping Name: Acetyl Chloride
Other Names: Acetic acid chloride
Acetic chloride
Ethanoyl chloride

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER DIRECTLY ON MATERIAL! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE AND ACETIC ACID!

Hazards:
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride
- Corrosive to most metals particularly in the presence of moisture producing flammable hydrogen gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:
- Colorless to pale yellow fuming liquid
- Pungent, irritating odor
- Sinks in water and reacts violently with water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not allow water to come in contact with material; if material is on fire, use dry chemical to extinguish; if water must be used, use in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns rinse with water and apply a clean dry dressing

CAS: 75-36-5

DIMETHYLACETAMIDE

Other Names: Acetic acid dimethylamide
Dimethylamide acetate
N,N-Dimethylacetamide
DMA
DMAC

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless, oily liquid
- Weak fishy or ammonia-like odor
- Initially floats on the surface of water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -4° F

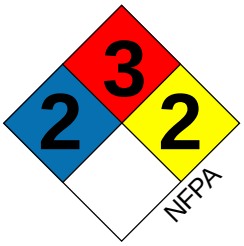
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 127-19-5



VINYL ACETATE

(INHIBITED)

UN 1301

Shipping Name: Vinyl acetate, inhibited

Other Names:		
	Acetic acid, ethinyl ester	VAC
	Acetic acid, vinyl ester	VAM
	1-Acetoxyethylene	Vinyl A Monomer

WARNING! ● MAY REACT WITH ITSELF WITH EXPLOSIVE VIOLENCE BLOCKING RELIEF VALVES LEADING TO TANK EXPLOSION!

Hazards:

- Highly flammable
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Reacts violently with strong acids, bases and peroxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, fruity odor
- Floats on water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resitant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-05-4

METHYL ACETATE

UN 1231

Shipping Name: Methyl acetate
Other Names: Acetic acid, methyl ester
Methyl acetic ester

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fruity odor
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 79-20-9

n-BUTYL ACETATE

UN 1123

Shipping Name: Butyl acetates
Other Names: Acetic acid, n-butyl ester
1-Butyl acetate
Butyl ethanoate

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Slightly irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Strong, fruity odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

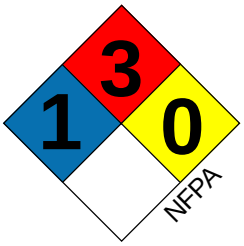
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 123-86-4



n-PROPYL ACETATE

UN 1276

Shipping Name: n-Propyl acetate
Other Names: Acetic acid, n-propyl ester
1-Acetoxypropane
1-Propyl acetate

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Pleasant, sweet odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

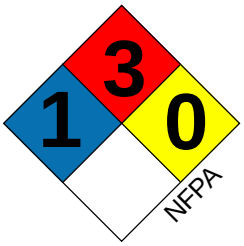
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-60-4



ETHYL ACETATE

UN 1173

Shipping Name: Ethyl acetate
Other Names: Acetic ester
Acetic ether
Ethyl ethanoate

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pleasant, fruity odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 141-78-6

PENTAN-2,4-DIONE

UN 2310

Shipping Name: Pentan-2,4-dione

Other Names: Acetoacetone
Acetyl acetone
Diacetylmethane
2,4-Pentadione
Pentadione

Hazards:

- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flash back
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet odor
- Floats in water and is moderately soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -9° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol based foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support (CPR) as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 123-54-6

ACETONE CYANOHYDRIN

(STABILIZED)

UN 1541

Shipping Name: Acetone cyanohydrin, stabilized

Other Names: Acetocyanohydrin 2-Cyano-2-propanol
2-Hydroxyisobutyronitrile Isopropylcyanohydrin
2-Methyl lactonitrile

WARNING!
- POISON! BREATHING THE VAPORS, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! PRODUCES CYANIDE IN THE BODY!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXPOSURE TO HEAT WILL PRODUCE CYANIDE GAS!

Hazards:
- Decomposes in water to form hydrogen cyanide
- Combustion products include the toxic gases hydrogen cyanide and nitrogen oxides
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to light yellow liquid
- Almond-like odor
- Soluble in water
- Decomposes in water to form hydrogen cyanide
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

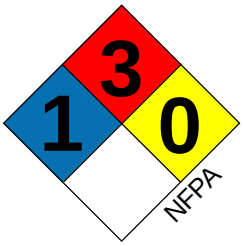
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of fog to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform mouth to mouth resuscitation; use a bag/mask apparatus
- Note to physician: can produce cyanide toxicity, if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 75-86-5



ACETONE

UN 1090

Shipping Name: Acetone
Other Names: Dimethyl ketone
Methyl ketone
2-Propanone

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Vapors may travel long distances to ignition sources and flashback
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Smells like fingernail polish remover
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

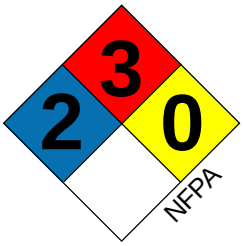
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns rinse with water and apply a clean dry dressing

CAS: 67-64-1



ACETONITRILE

UN 1648

Shipping Name: Acetonitrile

Other Names: Cyanomethane, Ethanenitrile, Ethyl nitrile, Methanecarbonitrile, Methyl cyanide

Hazards:

- Breathing the vapors, skin contact or swallowing the liquid can kill you! Converted to cyanide in the body!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Combustion products include toxic hydrogen cyanide and nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, ether-like smell
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, specially trained personnel can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: can cause cyanide poisoning; if symptoms indicate, treat with the cyanide antidote kit

CAS: 75-05-8

2-CHLORO-ACETOPHENONE

UN 1697

Other Names: CAF, CAP, Chloroacetaphenone, CN, Mace, Tear gas

Hazards:
- Swallowing the material may be harmful
- Severely irritating to the eyes; also irritating to the skin, nose and lungs; prolonged contact can cause burns
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to gray solid
- Flower-like smell at low concentrations; irritating smell at high concentrations
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Used as a crowd control agent

Operational Level Training Response:

RELEASE, NO FIRE:
- Prevent runnoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Use water to extinguish fire
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location
- Use unattended equipment whenever possible

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 532-27-4

DIKETENE

(INHIBITED)

UN 2521

Shipping Name: Diketene, inhibited

Other Names: Acetyl ketene; 3-Buteno-beta-lactone; Ketene dimer; 4-Methylene Oxetanone

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:

- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Description:

- Clear, colorless liquid
- Pungent odor
- Reacts with water releasing heat and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 20° F

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

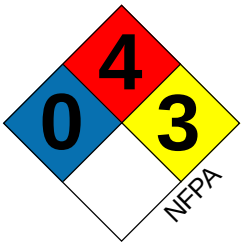
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly stops, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 674-82-8



ACETYLENE

(Dissolved)

UN 1001

Shipping Name: Acetylene, dissolved
Other Names: Ethine
Ethyne

WARNING! ● EXTREMELY FLAMMABLE!
● CONTAINER MAY EXPLODE WHEN EXPOSED TO FIRE!

Hazards:

- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Reacts explosively with many materials
- Exposure of cylinders to fire and flame or elevated temperatures may cause cylinder to rupture or frangible disc to burst, releasing entire contents of cylinder. Ruptured or venting cylinders may rocket through buildings and/or travel a considerable distance

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- Garlic or ether-like odor
- Soluble in water
- Extremely flammable
- Vapors are lighter than air
- Often shipped and stored dissolved in acetone
- Not shipped by rail tank cars
- Cylinders have a fusible plug not a relief valve

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention

CAS: 74-86-2

1,2-DICHLOROETHYLENE

UN 1150

Shipping Name: Dichloroethylene
Other Names: Acetylene dichloride
1,2-DCE
Dioform
Ethylene dichloride

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, pleasant odor
- Sinks in water and is insoluble in water
- Highly flammable
- Produces large amounts of vapor
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 119° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 540-59-0

TETRACHLOROETHANE

UN 1702

Shipping Name: Tetrachloroethane
Other Names: Acetylene tetrachloride
Bonoform
Cellon
1,1,2,2-Tetrachloroethane
s-Tetrachloroethane

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Decomposition products upon heating include toxic hydrogen chloride
- Corrosive to some plastics and rubber

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to light yellow liquid
- Sweet odor
- Sinks in water and is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 79-34-5

TRICHLOROETHYLENE

UN 1710

Shipping Name: Trichloroethylene

Other Names: Acetylene trichloride, Trichlor, Ethylene trichloride, Trichloroethene, TCE, TRI

Hazards:

- Irritating to skin, eyes, nose and lungs; prolonged contact with skin will cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Description:

- Colorless liquid
- Sweet odor, similar to chloroform
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors or blanket spilled material - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 79-01-6

CALCIUM CARBIDE

UN 1402

Shipping Name: Calcium carbide
Other Names: Acetylenogen
Calcium acetylide
Carbide

WARNING! ● DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO PRODUCE EXPLOSIVE ACETYLENE GAS!

Hazards:

- Highly flammable
- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Gray to black powder or solid
- Faint garlic-like odor
- Reacts violently with water to form explosive acetylene gas and toxic calcium hydroxide
- Highly flammable

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not allow water to come in contact with the material; if material is on fire, use dry chemical to extinguish
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 75-20-7

ALLYLTRICHLOROSILANE

(STABILIZED)

UN 1724

Shipping Name: Allyltrichlorosilane, stabilized
Other Names: Acetylsilicon trichloride
Propene-3-yltrichlorosilane
Trichloroallysilane

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER ON MATERIAL! REACTS VIGOROUSLY WITH WATER TO FORM TOXIC HYDROCHLORIC ACID!

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent smell
- Reacts vigorously with water to form hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-37-9

alpha-CHLOROPROPIONIC ACID

UN 2511

Shipping Name: 2-Chloropropionic acid

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride
- Corrosive to many metals

Description:

- A liquid
- Pungent odor
- Sinks in water and is soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 10° F

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 598-78-7

ACRYLIC ACID

(INHIBITED)

UN 2218

Shipping Name: Acrylic acid, inhibited

Other Names: Acroleic acid; Ethylene carboxylic acid; GAA; Glacial acrylic acid; Propene acid; Propenoic acid; 2-Propenoic acid; Vinyl formic acid

WARNING! ● MAY REACT WITH ITSELF BLOCKING RELIEF VALVES LEADING TO TANK EXPLOSION!

Hazards:

- Vapors or liquid can cause burns to eyes, nose, skin and lungs
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- May react with itself without warning with explosive violence
- Vapors may travel long distances to ignition sources and flash back

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Shipped as a colorless liquid
- Sharp rancid odor
- Initally sinks in water and is soluble in water
- Very flammable
- Freezes at 56° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors

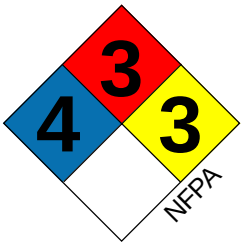
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 79-10-7



ACROLEIN

(INHIBITED)

UN 1092

Shipping Name: Acrolein, inhibited

Other Names: Acryladehyde 2-Propenal
Allyl aldehyde
Biocide

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES LEADING TO TANK EXPLOSION!

Hazards:
- Highly flammable
- Container may BLEVE when exposed to fire
- Irritating to eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Reacts with acids, alkalis and air producing a violent reaction with itself
- Prolonged contact with skin will cause burns

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

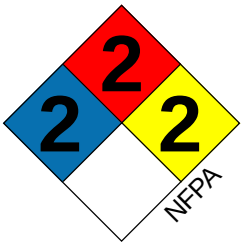
Description:
- Colorless to yellow liquid
- Sharp pungent odor
- Floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-02-8



ACRYLAMIDE

UN 2074

Shipping Name: Acrylamide
Other Names: Acrylic amide
Propenamide
Vinyl amide

WARNING! ● MAY DECOMPOSE WITH HEAT AND REACT EXPLOSIVELY WITH ITSELF AT TEMPERATURES ABOVE 184° F RELEASING TOXIC AMMONIA GAS!

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides

Description:
- White solid
- No odor
- Initially sinks in water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 79-06-1

ACRYLYL CHLORIDE

NA 9188

Other Names: Acrylic acid chloride
Acryloyl chloride
Propenoyl chloride

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- HEATED MATERIAL MAY REACT WITH ITSELF LEADING TO CONTAINER EXPLOSION!

Hazards:
- Highly flammable
- Container may BLEVE when exposed to fire
- Severely irritating to skin, eyes, nose and lungs; prolonged contact with skin may cause burns
- Combustion products include toxic hydrogen chloride

Description:
- A liquid
- Irritating odor
- Sinks in water and decomposes in water to hydrochloric acid
- Highly flammable

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 814-68-6

BUTYL ACRYLATE

(INHIBITED)

UN 2348

Other Names: Acrylic acid, butyl ester
n-Butylacrylate
Butyl-2-propenoate

WARNING! • MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:

- Very irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White water-like liquid
- Biting, sharp odor
- Floats on the surface of water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

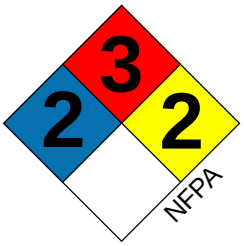
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS 141-32-2



ETHYL ACRYLATE

(INHIBITED)

UN 1917

Shipping Name: Ethyl acrylate, inhibited
Other Names: Acrylic acid, ethyl ester
Ethyl propenoate
Ethyl 2-propenoate
Propenoic acid, ethyl ester

WARNING! ● MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:

- Highly flammable
- Very irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Acrid, penetrating odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If venting sound suddenly increases and/or unexpectedly stops, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 140-88-5

METHYL ACRYLATE
(INHIBITED)

UN 1919

Shipping Name: Methyl acrylate, inhibited
Other Names: Acrylic acid, methyl ester
Methoxycarbonylethylene
Methyl propenoate
Propenoic acid, methyl ester

WARNING! • MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:
- Highly irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Acrid odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent and material runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly increases or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 96-33-3

ACRYLONITRILE

(INHIBITED)

UN 1093

Shipping Name: Acrylonitrile, inhibited

Other Names: Carbacryl, 2-Propenenitrile, Cyanoethylene, Vinyl cyanide, Propenenitrile

WARNING!

- POISON! BREATHING THE VAPORS, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! PRODUCES CYANIDE IN THE BODY!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Prolonged contact with skin will cause burns
- Combustion products include toxic cyanide gas and nitrogen oxide

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Evacuate the immediate area and downwind for a large release
- Remove all ignition sources
- For containers exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- Strong, pungent smell like onions or garlic
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a risk to the responder. Decontaminate the victim from a safe distance with a stream of water. Provide Basic Life Support/CPR as needed, then further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Note to physician: can produce cyanide toxicity, if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 107-13-1

CYCLOHEXIMIDE

Other Names: Actidione
Actidone
Naramycin

Hazards:
- Extremely irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

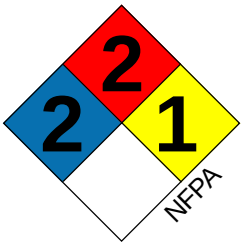
Description:
- Colorless solid
- Forms a fragrant vapor upon contact with alkalis
- Slightly soluble in water
- Flammable

Operational Level Training Response:
RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 66-81-9



ADIPONITRILE

UN 2205

Shipping Name: Adiponitrile
Other Names: Adipic acid dinitrile
1,4-Dicyanobutane
Hexanedinitrile
Tetramethylene cyanide

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! PRODUCES CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXPOSURE TO HEAT WILL PRODUCE TOXIC CYANIDE GAS!

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic hydrogen cyanide and nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Practically odorless
- Floats on the surface of water and is moderately soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 34° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 111-69-3

CHLORINE DIOXIDE HYDRATE

NA 9191

Shipping Name: Chlorine dioxide, hydrate, frozen
Other Names: Alcide
Chlorine dioxide
Chlorine dioxide hydrate (frozen)
Chlorine peroxide

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- When heated, vapors in closed spaces (e.g., tanks, sewers, buildings) in the presence of combustible materials may explode
- Reacts with water or steam to produce hydrochloric acid
- Decomposes upon heating releasing toxic chlorine gas

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Orange to red gas
- Shipped frozen, appearing like a solid block of ice
- Faint bleach-like odor
- Flammable and a strong oxidizer which may cause other combustible materials to burn
- Vapors are heavier than air and will collect and stay in low areas
- A liquid below 52° F

Operational Level Training Response:
RELEASE, NO FIRE:
- Keep material frozen if possible
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; if surrounding materials are on fire and conditions permit, do not extinguish. Cool exposures using unattended monitors. If fire must be fought, use an agent appropriate for the burning material
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of deforming), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10049-04-4

ALDICARB

UN 2757

Shipping Name: Carbamate pesticides, solid, toxic
Other Names: Carbamyl
Temik

Hazards:
- Container may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Decomposition products upon heating include toxic sulfur oxides

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- Slight sulfur-like odor
- Sinks in water and is insoluble in water
- Nonflammable
- A carbamate insecticide

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: a carbamate insecticide; if symptoms indicate, initial treatment includes atropine

CAS: 116-06-3

DINITROPHENOL

UN 1320 (Wet with more than 15% water)
UN 1599 (Solution)
UN 0076 (Dry)

Shipping Names: UN 1599 Dinitrophenol solutions
UN 1320 Dinitrophenol, wetted with not less than 15% water
UN 0076 Dinitrophenol, dry or wetted with less than 15% water

Other Names: Aldifen, Dinofan, 2,4-DNP, 2,4-Dinitrophenol, Nitrophen

WARNING! ● KEEP MATERIAL WET! DRY MATERIAL (less than 15% water added) WILL SPONTANEOUSLY EXPLODE IF HEATED OR SHOCKED!

Hazards:
- Very irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Yellow crystalline solid
- Sweet musty odor
- Sinks in water and is insoluble in water
- Flammable
- May be shipped or stored dry, as a wetted solid or in water solution

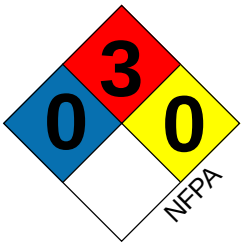
Operational Level Training Response:

RELEASE, NO FIRE:
- Dilute material with foam or water
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 51-28-5



ETHYL ALCOHOL

UN 1170

Shipping Name: Ethyl alcohol or Ethanol

Other Names:

Algrain	Ethanol
Anhydrol	ETOH
Anhydrous ethanol	Grain alcohol
Denatured alcohol	Methylcarbinol

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin and eyes

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Wine or whiskey-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Denatured alcohol contains small amounts of toxic materials

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 64-17-5

METHYL ACETYLENE, PROPADIENE MIXTURE

(STABILIZED)

UN 1060

Shipping Name: Methyl acetylene, propadiene mixture, stabilized
Other Names: Allene-methyl acetylene mixture
MAPP gas
Methyl acetylene-allene mixture

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:
- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Moderately irritating to skin, eyes, nose and lungs
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Colorless liquefied compressed gas
- Garlic-like odor
- Liquid floats on water and boils
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

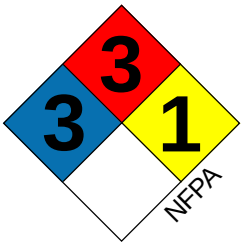
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: none



ALLYL BROMIDE

UN 1099

Shipping Name: Allyl Bromide
Other Names: Bromoallylene
3-Bromo-1-propene
3-Bromopropylene
2-Propenyl bromide

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Severely irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Highly flammable
- Container may BLEVE when exposed to fire
- When heated may react with itself without warning with explosive violence
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion produces toxic hydrogen bromide gas

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- Pungent, unpleasant smell
- Sinks in water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

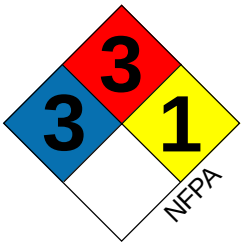
FIRE:

- Use foam or dry chemical if available in sufficient amounts; under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely.
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 106-95-6



ALLYL CHLORIDE

UN 1100

Shipping Name: Allyl Chloride

Other Names: Chlorallylene, Chloropropylene, Chloropropene, Propenyl chloride, 3-Chloropropene

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Severely irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Highly flammable
- Container may BLEVE when exposed to fire
- When heated, may react with itself without warning with explosive violence
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion produces the toxic gas hydrogen chloride and phosgene

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow-brown or red liquid
- Sharp and irritating odor
- Floats on water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

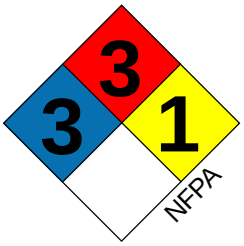
FIRE:

- Use foam or dry chemical if available in sufficient amounts; under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely.
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-05-1



ALLYL CHLOROFORMATE

UN 1722

Shipping Name: Allyl Chloroformate
Other Names: Allyl chlorocarbonate
2-Propenyl chloroformate

Hazards:

- Severely irritating to skin, eyes, nose and lungs
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- When heated may react with itself without warning with explosive violence
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Extremely irritating smell
- Sinks in water and is insoluble in water and reacts with water to form allyl alcohol and chloroformic acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Use foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 2937-50-0

ALLYLAMINE

UN 2334

Shipping Name: Allylamine

Other Names: 3-Aminopropene, 3-Aminopropylene, Monoallylamine, 2-Propenamine, 2-Propen-1-amine

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- When heated may react with itself without warning with explosive violence
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release.
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- Ammonia-like odor
- Completely soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam only to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-11-9

BENZYL BROMIDE

UN 1737

Shipping Name: Benzyl bromide
Other Names: alpha-Bromotoluene
Bromophenylmethane

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- In the presence of metals may react violently with itself without warning
- Combustion products include toxic hydrogen bromide

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Irritating odor like tear gas
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 25° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 100-39-0

BENZOYL CHLORIDE

UN 1736

Shipping Name: Benzoyl chloride
Other Names: Benzenecarbonyl chloride
alpha-Chlorobenzaldehyde

WARNING! • DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROCHLORIC ACID!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; can cause burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride and phosgene gas

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to slightly brown liquid
- Pungent odor
- Sinks in water and reacts violently with water to produce toxic hydrochloric acid
- Very flammable
- Fumes in moist air to form hydrogen chloride
- Freezes at 30° F
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not allow water to come in contact with the material; if material is on fire, use dry chemical to extinguish
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 98-88-4

BENZYL CHLORIDE

(USUALLY STABILIZED)

UN 1738

Shipping Name: Benzyl chloride
Other Names: alpha-Chlorotoluene
(Chloromethyl) benzene
Chlorophenyl methane

Hazards:

- May react with itself vigorously in the presence of metals releasing heat and hydrogen chloride
- Severely irritating to skin, eyes, nose and lungs
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to slightly yellow liquid
- Irritating, pungent odor
- Sinks in water and is insoluble in water
- Reacts slowly with water releasing hydrochloric acid
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors -contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 100-44-7

CUMENE HYDROPEROXIDE

UN 2116

Other Names: CHP
alpha-Cumene hydroperoxide
Cumyl hydroperoxide
Dimethylbenzyl hydroperoxide

WARNING!
- MAY SPONTANEOUSLY EXPLODE IF EXPOSED TO HEAT OR FIRE!
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Container may BLEVE or explode when exposed to fire
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- If the material is involved in or exposed to fire EVACUATE THE AREA IN ALL DIRECTIONS AND CALL FOR EXPERT HELP; THE PROBABILITY OF EXPLOSION IS VERY HIGH IN THIS SITUATION
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to pale yellow liquid
- Sharp irritating aromatic odor
- Slightly soluble in water
- Very flammable
- Highly explosive
- Freezes at 16° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

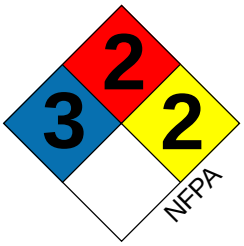
FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support /CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 80-15-9

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Dithiobiuret			3	1	0	
Ditridecyl phthalate			**0**	**1**	**0**	
Diundecyl phthalate			0	1	0	
Diuron			1	0	0	
DM (10-Chloro-5,10-dihydrophenarsazine			2	1	0	
DMSO			**1**	**1**	**0**	
DNBP			3	2	0	
Dodecanol			**0**	**1**	**0**	
Dodecene			**0**	**1**	**0**	
Dodecylbenzene			**1**	**1**	**0**	
Dodecylbenzene sulfonic acid	2584	Corrosive	1	1	0	
Dodecylbenzene sulfonic acid, calcium salt			1	1	0	
Dodecylbenzene sulfonic acid, isopropyl amine salt			1	1	0	
Dodecylbenzene sulfonic acid, sodium salt			1	1	0	
Dodecylbenzene sulfonic acid, triethanol amine salt			1	1	0	
Dodecyl diphenyl ether disulfonate			1	0	0	
Dodecyl methacrylate			0	1	1	
Dodecyl/pentadecyl methacrylate			0	1	1	
Dodecyl sulfate, diethanolamine salt			1	1	0	
Dodecyl sulfate, magnesium salt			1	0	0	
Dodecyl sulfate, sodium salt			1	0	0	
Dodecyl sulfate, triethanolamine salt			1	0	0	
Dodecyltrichlorosilane	1771	Corrosive	3	2	2	
Dowtherm			1	1	0	
Endosulfan	2761	Poison	4	1	0	
alpha-Endosulfan			4	1	0	
beta-Endosulfan			4	1	0	
Endosulfan sulfate			4	1	0	
Endothion			4	1	2	
Endrin	2761	Poison	4	1	0	
Endrin aldehyde			4	1	0	
Enterotoxin B			4	1	0	
EPN			4	1	0	
Estradiol 17 b			1	1	0	
Estrone			1	1	0	
Ethienocarb			3	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



METHACRYLIC ACID

(INHIBITED)

UN 2531

Shipping Name: Methacrylic acid, inhibited
Other Names: alpha-Methacrylic acid
2-Methyl-2-propenoic acid

WARNING! ● MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO CONTAINER EXPLOSION!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Corrosive to metals

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Acrid, repulsive odor
- Sinks slowly in water and is moderately soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 61° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly or unexpectedly increases or stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 79-41-4

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Methacrolein diacetate			3	1	1	
Methacrylaldehyde	2396	Flammable	**3**	**3**	**2**	
Methacrylic anhydride			3	1	2	
Methacryloyloxyethyl isocyanate			3	2	0	
Methallyl chloride			**2**	**3**	**1**	
Methamidophos			3	1	0	
Methanearsonic acid, sodium salt			1	1	0	
Methiocarb			3	1	0	
Methomyl			3	1	0	
3-Methoxybutyl acetate			**1**	**2**	**0**	
Methoxychlor			2	1	0	
Methoxyethyl mercuric acetate			3	1	0	
Methoxymethyl isocyanate	2605	Flammable	3	2	0	
Methyl acetoacetate			**2**	**2**	**0**	
Methyl acetone	1232	Flammable	**1**	**3**	**0**	
Methyl acetylene			1	4	2	
Methyl amyl acetate	1233	Flammable	**1**	**2**	**0**	
N-methyl aniline	2294	Poison	2	2	0	
Methyl azinphos	2783	Poison	4	0	0	
Methyl azoxymethanol acetate			1	3	1	
Methyl 2-benzimidazole carbamate			2	1	0	
Methyl benzoate	2938	Poison	**0**	**2**	**0**	
alpha-Methyl benzyl alcohol	2937	Poison	**0**	**2**	**0**	
2-Methyl-1-butene	2459	Flammable	**2**	**4**	**0**	
2-Methyl-2-butene	2460	Flammable	**2**	**3**	**0**	
3-Methyl-1-butene	2561	Flammable	**2**	**4**	**0**	
Methyl butenol			1	3	0	
Methyl chloroformate	1238	Poison	1	3	1	
Methyl chloromethyl ether	1239	Poison	**3**	**3**	**2**	
Methyl cyclohexanone	2297	Flammable	**1**	**2**	**0**	
Methyl cyclopentadiene dimer			1	3	0	
Methyl cyclopentadienyl manganese tricarbonyl			3	1	1	
Methyl dichloroarsine	1556	Poison	3	1	1	
4,4'-Methylene-bis-(2-chloroaniline)			1	1	0	
4,4'-Methylene-bis-(2-methyaniline)			1	1	0	
Methylene-bis-(phenylIsocyanate) (or MBI)	2489		2	1	1	
4,4'-Methylene dianiline			**3**	**1**	**0**	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

ISOPROPENYLBENZENE

UN 2303

Shipping Name: Isopropenylbenzene
Other Names: AMS
alpha-Methyl styrene
1-Methyl-1-phenylethene
2-Phenylpropylene

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- At high temperatures may react with itself without warning blocking relief valves leading to container explosion
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sharp, aromatic odor
- Floats on the surface of water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -9° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly increases or unexpecedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

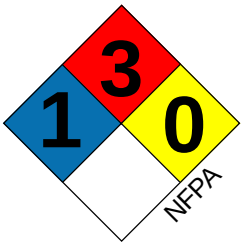
First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 98-83-9

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Mevinphos	2783	Poison	4	1	0	
Mexacarbate	2757	Poison	3	1	0	
Michler's ketone			3	1	0	
Mineral oil			**0**	**1**	**0**	
Mirex			2	1	0	
Molybdinum trioxide			2	0	0	
Monochlorotetrafluoroethane			1	0	0	
Monochlorotrifluoromethane			1	0	0	
Monocrotaline			2	2	0	
Monocrotophos			3	1	0	
Mustine hydrochloride			4	1	0	
MVP (2-Methyl-5-vinyl pyridine)	3073	Poison	2	2	0	
Myrcene			2	2	0	
Nabam			2	0	0	
Nafenopin			2	2	0	
Naled			2	0	1	
Naphtha: coal tar	2553	Flammable	**2**	**2**	**0**	
Naphtha: stoddard solvent	1271	Flammable	**1**	**4**	**0**	
Naphtha: VM & P			**1**	**3**	**0**	
Naphthalene	1334	Flammable solid	**2**	**2**	**0**	
alpha-Naphthylamine	2077	Poison	**2**	**1**	**0**	
Napthylthiourea	1651	Poison	4	1	0	
Napthylurea	1652	Poison		1	0	
Neodecanoic acid			0	1	0	
N-ethyl-2-2' di(chloroethyl) amine (HN_1)			4	1	0	
Neon	1065	Nonflammable gas	0	0	0	
Nickel	2881	Spontaneously combustible	**2**	**4**	**1**	
Nickel acetate			2	0	0	
Nickel ammonium sulfate	9138		2	0	0	
Nickel bromide			2	0	0	
Nickel chloride			2	0	0	
Nickel cyanide	1653	Poison	2	0	0	
Nickel fluoroborate			2	0	0	
Nickel formate			2	0	0	
Nickel hydroxide	9140		2	1	0	
Nickel nitrate	2725	Oxidizer	2	0	0	OX

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



alpha-PINENE

UN 2368

Shipping Name: alpha-Pinene
Other Names: Pinene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless oily liquid
- Turpentine or pine-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 80-56-8

PHENYLACETONITRILE

UN 2470

Shipping Name: Phenylacetonitrile, liquid

Other Names: alpha-Tolunitrile, Benzeneacetonitrile, Benzyl cyanide, Benzyl nitrile, Cyanotoluene

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen cyanide

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless, oily liquid
- Aromatic odor
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 140-29-4

TRIISOBUTYLALUMINUM

UN 3051

Shipping Name: Aluminum alkyls
Other Names: Aluminum, triisobutyl
TIBAL
Triisobutylalane

WARNING!

- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE! IGNITES SPONTANEOUSLY IN AIR!
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER FORMING HIGHLY FLAMMABLE GASES!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Reacts violently with water to produce highly flammable gases
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 34° F
- Usually shipped and stored under a nitrogen blanket

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH
- Specially trained personnel operating from a safe distance can fight fires using dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 100-99-2

AN/FO

NA 0331 (Contains only prilled ammonium nitrate)

Shipping Name: Ammonium nitrate/fuel oil mixtures
Other Names: AMFO
Ammonium nitrate: fuel oil

WARNING! ● EXPLOSIVE! MAY DETONATE IF INVOLVED IN A FIRE!

Hazards:
- Potentially explosive mixture, but is difficult to detonate
- May interfere with the body's ability to use oxygen
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

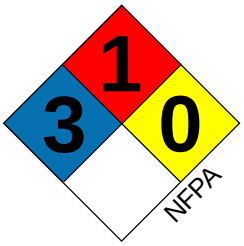
Description:
- A slurry of ammonium nitrate in fuel oil
- Odor like fuel oil
- Flammable
- No information on water solubility
- Used as an explosive

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the antidote



AMMONIA

(ANHYDROUS)

UN 1005

Shipping Name: Ammonia, anhydrous

Other Names: AM-FOL, Ammonia, anhydrous, Anhydrous ammonia, Refrigerant R717, Nitro-Sil

WARNING!

- POISON! BREATHING THE VAPORS OR SKIN CONTACT CAN KILL YOU!
- Fire fighting gear including SCBA does not provide adequate protection. If exposure to the chemical occurs, remove and isolate gear immediately and thoroughly decontaminate personnel.
- DO NOT ADD WATER TO LIQUID AMMONIA! WILL INCREASE EVAPORATION!

Hazards:

- Contact with liquid may cause frostbite
- Severely irritating to skin, eyes, nose, throat and lungs, may cause burns
- May burn or explode in closed spaces (e.g., tanks, sewers, buildings)
- Produces a toxic, visible or invisible gas cloud which may hug the ground when cool
- Containers may BLEVE or explode when exposed to fire
- Corrosive to metals

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For containers exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- May be shipped or stored as a compressed gas or cryogenic liquid
- Strong, pungent odor
- Soluble in water
- Flammable
- Gas is lighter then air but may hug the ground when cool

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if you can do it safely from a distance
- DO NOT PUT WATER ON LIQUID AMMONIA
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7664-41-7

FORMIC ACID

UN 1779

Shipping Name: Formic acid
Other Names: Aminic acid
Formylic acid
Hydrogen carboxylic acid
Methanoic acid

Hazards:

- Very irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns and blindness
- Very flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- May deteriorate upon normal storage causing pressure buildup and container failure

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, fuming liquid
- Irritating odor
- Sinks in water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 47° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 64-18-6

2,4-DINITROANILINE

UN 1596

Shipping Name: Dinitroanilines
Other Names: 1-Amino-2,4-dinitrobenzene
2,4-Dinitro-1-aminobenzamine
2,4-Dinitrobenzamine
DNA

WARNING!
- POISON! BREATHING THE VAPORS OR DUST CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXPLOSIVE! CONTAINER OR MATERIAL MAY EXPLODE WHEN EXPOSED TO HEAT OR FLAMES!

Hazards:
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Can affect the body's ability to use oxygen
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Yellow solid
- Musty odor
- Sinks in water and is insoluble in water
- Flammable and explosive when exposed to heat or flame
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 97-02-9

ISOPROPANOLAMINE

UN 2734

Shipping Name: Amines, liquid, corrosive, flammable, n.o.s.
Other Names: 1-Amino-2-propanol
2-Hydroxypropylamine
1-Methyl-2-aminoethanol
Monoisopropanolamine

Hazards:

- Irritating to skin, eyes, nose and lungs; prolonged contact with skin will cause burns
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, thick liquid
- Ammonia-like odor
- Initially floats on the surface of water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 35° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 78-96-6

ANILINE

UN 1547

Shipping Name: Aniline

Other Names: Aminobenzene, Benzenamine, Aminophen, Blue oil, Aniline oil, Phenylamine

Hazards:

- Inhalation of vapors, ingestion of liquid or skin contact with liquid can cause severe illness
- May interfere with the body's ability to use oxygen
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways notify downstream users of potentially contaminated water

Description:

- Colorless to light brown oily liquid
- Musty, fishy odor
- Sinks slowly in water and is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

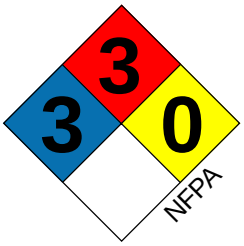
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Symptoms may be delayed for up to 48 hours
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the antidote

CAS: 62-53-3



n-BUTYLAMINE

UN 1125

Shipping Name: n-Butylamine
Other Names: 1-Aminobutane
Butylamine
Monobutylamine

Hazards:

- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin or eyes can cause burns
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Fish-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from rain or fire fighting from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

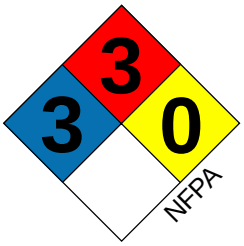
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 109-73-9



CYCLOHEXYLAMINE

UN 2357

Shipping Name: Cyclohexylamine
Other Names: Aminocyclohexane
Aminohexahydrobenzene
CHA
Hexahydroanaline

Hazards:

- Highly flammable
- Extremely irritating to skin, eyes, nose and lungs; prolonged contact can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE when exposed to fire
- Combustion or decomposition upon heating produces toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Ammonia or strong fish-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

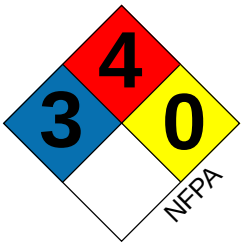
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-91-8



ETHYLAMINE

UN 1036

Shipping Name: Ethylamine
Other Names: Aminoethane, Ethanamine, ETN, MEA, Monoethylamine

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Severely irritating to skin, eyes, nose and lungs; can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode with or with out ignition
- Corrosive to aluminum, copper, tin, zinc and most of their alloys including brass
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas which becomes a liquid below 62° F
- Pungent ammonia-like odor
- Soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- May be shipped in a water solution

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-04-7

ETHANOLAMINE

UN 2491

Shipping Name: Ethanolamine or Ethanolamine solutions
Other Names: 2-Aminoethanol
Glycinol Monoethanolamine
MEA Olamine

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless thick liquid
- Fish-like odor
- Initially sinks in water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 51° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 141-43-5

DIETHYLENETRIAMINE

UN 2079

Shipping Name: Diethylenetriamine
Other Names: Aminoethylethandiamine
Bis-(2-aminoethyl) amine
DETA
2,2'-Diaminodiethylamine

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Ammonia-like odor
- Soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn, if liquid is on fire, specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 111-40-0

t-BUTYLAMINE

UN 2734

Shipping Name: Amines, liquid, corrosive, flammable, n.o.s.
Other Names: 2-Aminoisobutane
tert-Butylamine
1,1 Dimethyl ethylamine

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides
- Corrosive to some plastics

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Ammonia-like odor
- Soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistent (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 75-64-9

METHYLAMINE
(ANHYDROUS)

UN 1061

Shipping Name: Methylamine, anhydrous
Other Names: Aminomethane
Monomethylamine

WARNING!
- EXTREMELY FLAMMABLE!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with the liquefied gas may cause frostbite
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Colorless gas
- May be shipped or stored as a refrigerated liquefied gas
- Ammonia-like odor
- Soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- A liquid below 21° F

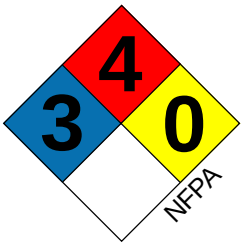
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-89-5



METHYLAMINE

(AQUEOUS SOLUTION)

UN 1235

Shipping Name: Methylamine, aqueous solution
Other Names: Aminomethane
MMA

WARNING!

- EXTREMELY FLAMMABLE!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Description:

- Colorless liquid
- Fish-like odor at low concentrations, ammonia-like odor at higher concentrations
- Soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Shipped as a 30% to 40% solution in water
- Produces large volumes of vapor
- Boils between 86° F and 106° F

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support (CPR) as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-89-5

N,N-DIMETHYL-p-PHENYLENEDIAMINE

Other Names: 4-Amino-N,N-dimethylaniline
DMPD

WARNING!
- POISON! BREATHING THE DUST, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Irritating to skin and eyes
- May interfere with the body's ability to use oxygen
- Combustion and decomposition products upon heating include toxic nitrogen oxides

Description:
- Colorless to reddish-violet solid
- No odor
- Initially sinks in water and is soluble in water
- Flammable

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

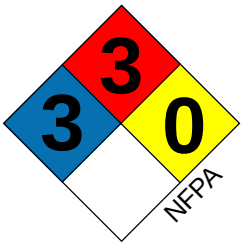
Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 99-98-9



DIETHYLAMINE

UN 1154

Shipping Name: Diethylamine
Other Names: 2-Aminopentane
DEA
DEN

Hazards:

- Very irritating to nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fishy, ammonia-like odor
- Initally floats on the surface of water and dissolves in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-89-7

ISOPROPYLAMINE

UN 1221

Shipping Name: Isopropylamine
Other Names: 2-Aminopropane
1-Methylethylamine
2-Propylamine

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Ammonia-like odor
- Soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 92° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-31-0

AMINOPYRIDINES

UN 2671

Shipping Name: Aminopyridines

Other Names: 4-Aminopyridine Avitrol
m-Aminopyridine 4-Pyridinamine
o-Aminopyridine 4-Pyridylamine
p-Aminopyridine

WARNING!
- POISON! BREATHING THE DUST, SWALLOWING THE MATERIAL OR SKIN CONTACT WILL KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White powder
- No odor
- Sinks in water and is moderately soluble in water
- Flammable

Operational Level Training Response:

RELEASE, NO FIRE:
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Cover material to protect from wind, rain or spray

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed

CAS: 504-24-5 (para, p-); 504-59-0 (ortho, o-); 462-08-8 (meta, m-)

TOLUIDINES

UN 1708

Shipping Name: Toluidines
Other Names: Aminotoluene
m-Toluidine
o-Toluidine
p-Toluidin

Hazards:

- May interfere with the body's ability to use oxygen
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Combustion and decomposition products upon heating include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to reddish-brown liquid
- Aromatic odor
- Very flammable
- Slightly soluble in water
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 95-53-4 (o, ortho), 106-49-0 (p, para), 108-44-1 (m, meta)

AMMONIUM HYDROXIDE

UN 2672 (10 to 35% Ammonia in water)
UN 2073 (35 to 50% Ammonia in water)

Shipping Name: Ammonia Solutions
Other Names: Ammonia monohydrate, Ammonia water, Ammonia solution, Aqueous ammonia

Hazards:
- Severely irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- May burn or explode in closed spaces (e.g., tanks, sewers, buildings)
- Decomposes upon heating to produce toxic ammonia and nitrogen oxide gases
- Vapors are lighter than air but may hug the ground when cool

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to milky white colored liquid
- Ammonia-like odor
- Soluble in water
- Flammable
- Vapors are lighter than air but may hug the ground when cool

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other sign of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1336-21-6

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Ammonium acetate			1	0	0	
Ammonium bicarbonate			0	0	0	
Ammonium bifluoride	1727	Corrosive	3	0	0	
Ammonium bisulfite	2693		2	0	0	
Ammonium bromide			1	0	0	
Ammonium carbonate	9084		1	0	0	
Ammonium chloride	9085		1	0	0	OX
Ammonium chromate	9086		2	0	1	OX
Ammonium citrate	9087		0	1	0	
Ammonium dichromate	1439	Oxidizer	**2**	**1**	**1**	**OX**
Ammonium fluoborate	9088		4	0	0	
Ammonium fluoride	2505	Poison	**3**	**0**	**0**	
Ammonium formate			0	1	0	
Ammonium gluconate			0	1	0	
Ammonium hypophosphite			1	2	0	
Ammonium iodide			1	0	0	
Ammonium lactate			0	1	0	
Ammonium lauryl sulfate			2	0	0	
Ammonium molybdate			1	0	0	
Ammonium nitrate	1942	Oxidizer	**0**	**0**	**3**	**OX**
Ammonium nitrate fertilizers	2072	Oxidizer	**0**	**0**	**3**	**OX**
Ammonium nitrate-phosphate mixture	2070		1	0	1	OX
Ammonium nitrate-sulfate mixture	2069	Oxidizer	1	0	1	OX
Ammonium nitrate-urea solution			2	0	1	
Ammonium oleate			0	1	0	
Ammonium oxalate	2449		1	1	0	
Ammonium pentaborate			2	0	0	
Ammonium permanganate	9190	Oxidizer	**0**	**0**	**3**	**OX**
Ammonium persulfate	1444	Oxidizer	1	0	1	OX
Ammonium phosphate			0	0	0	
Ammonium picrate (wet)	1310	Flammable solid	3	3	3	OX
Ammonium silicofluoride	2854	Poison	2	0	0	
Ammonium stearate			0	1	0	
Ammonium sulfamate	9089		0	0	0	
Ammonium sulfate			0	0	0	
Ammonium tartrate	9091		1	1	0	
Ammonium thiosulfate	9093		1	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

AMMONIUM CARBAMATE

NA 9083

Other Names: Ammonium aminoformate
Carbamic acid, ammonium salt

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic nitrogen oxides and ammonia

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White crystals
- Ammonia-like smell
- Soluble in water
- Flammable
- Slowly releases ammonia upon contact with air

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 1111-78-0

AMMONIUM BENZOATE

NA 9080

Other Names: Vulnoc AB

Hazards:	**Description:**
● Irritating to skin, eyes, nose and lungs ● Container may explode when exposed to fire ● Combustion or decomposition products upon heating include toxic nitrogen oxides	● Colorless solid ● Odorless ● Sinks in water and is moderately soluble in water ● Flammable
Awareness and Operational Level Training Response: ● Stay upwind ● Determine the extent of the problem ● Isolate the area of release or fire and deny entry ● For container exposed to fire evacuate the area in all directions because of the risk of explosion ● Notify local health and fire officials and pollution control agencies ● If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water	**Operational Level Training Response:** RELEASE, NO FIRE: ● Cover material to protect from wind, rain or spray ● Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release FIRE: ● Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material ● Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely ● If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 1863-63-4

AMMONIUM SULFIDE

(SOLUTION)

UN 2683

Shipping Name: Ammonium Sulfide, solution
Other Names: Ammonium monosulfide
Diammonium sulfide

WARNING!

- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! RELEASES TOXIC HYDROGEN SULFIDE IN THE BODY! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers ,buildings) may explode when exposed to fire
- When heated or mixed with acid, the solution produces toxic hydrogen sulfide gas
- Combustion products include toxic sulfur and nitrogen oxides

Awareness and Operational Training Level Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow solid; usually shipped and stored as a water solution (40 to 44%)
- Rotten egg and ammonia-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 0°F
- Produces large amounts of vapor

Operational Level Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause hydrogen sulfide poisoning; if symptoms indicate, amyl nitrite is the initial antidote

CAS: 12135-76-1

AMMONIUM PERCHLORATE

UN 1442
UN 0402

Shipping Name: Ammonium perchlorate
Other Names: Ammonium perchlorate high explosive
Ammonium perchlorate oxidizer

WARNING!
- HIGHLY EXPLOSIVE! HEAT, FRICTION OR SHOCK MAY CAUSE MATERIAL TO EXPLODE!
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE; MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Irritating to skin and eyes
- Decomposition products upon heating include toxic nitrogen oxides and ammonia

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire deny entry and call for expert help
- For container exposed to fire evacuate a wide area in all directions because of the high risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- Odorless
- Sinks in water and dissolves slowly in water
- Nonflammable but may cause combustibles to ignite

Operational Level Training Response:

RELEASE, NO FIRE:
- Keep released material wet
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Material does not burn, fight surrounding fire with an agent appropriate for the material burning
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 7790-98-9

AMMONIUM THIOCYANATE

NA 9092

Other Names: Ammonium rhodanate
Ammonium sulfocyanide
Amthio

Hazards:

- Irritating to skin, eyes, nose and lungs
- Combustion and decomposition products upon heating include toxic ammonia, nitrogen oxide, sulfur oxide and cyanide gases
- Corrosive to iron, copper and brass

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Consider evacuating or sheltering in place the immediate area and downwind if material is involved in a fire
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless solid
- Odorless
- Initally sinks in water and is soluble in water
- May be shipped and stored as a solid or in a water solution
- Flammable except in water solution

Operational Level Training Response:

RELEASE, NO FIRE:

- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Cover material to protect from blowing, rain or spray

FIRE:

- Solid material burns only with difficulty; as a water solution material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 1762-95-4

AMMONIUM SULFITE

NA 9090

Other Names: Ammonium sulphite
Diammonium sulfite
Sulfurous acid, diammonium salt

Hazards:
- Irritating to skin, eyes, nose and lungs
- Decomposition products upon heating include toxic nitrogen and sulfur oxides and ammonia

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White crystalline solid, like sand or sugar
- Odorless
- Initally sinks in water and is soluble in water
- Nonflammable

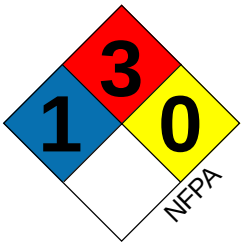
Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are not effective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 10196-04-0



AMYL ALCOHOL

UN 1105

Shipping Name: Amyl alcohols
Other Names: Amylol, n-Amyl alcohol, n-Butyl carbinol, 1-Pentanol, 1-Pentyl alcohol

Hazards:
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Very irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sweet, pleasant odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 71-41-0

METHYL AMYL KETONE

UN 1110

Shipping Name: Amyl methyl ketone
Other Names: Butylacetone
2-Heptanone
Methyl pentyl ketone

Hazards:

- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Banana-like odor
- Floats on water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 110-43-0

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
n-Amyl acetate	1104	Flammable	1	3	0	
n-Amyl chloride	1107	Flammable	1	3	0	
n-Amyl mercaptan	1111	Flammable	2	3	0	
n-Amyl nitrate	1112	Flammable	2	2	0	OX
n-Amyl nitrite	1113	Flammable	1	3	2	
Amyl phthalate			0	1	0	
o-Anisidine	2431	Poison	2	1	0	
o-Anisidine hydrochloride			2	1	0	
p-Anisidine	2431	Poison	2	1	0	
Anisole	2222	Flammable	1	2	0	
Anisoyl chloride	1729	Corrosive	1	1	1	
Anthracene			0	1	0	
Antimony (powder)	2871	Poison	2	2	1	
Antimony pentachloride	1730	Poison	3	0	1	
Antimony pentafluoride	1732	Corrosive	4	0	1	
Antimony potassium tartrate	1551	Poison	2	0	0	
Antimony tribromide	1549	Corrosive	3	0	1	
Antimony trichloride	1733	Corrosive	3	0	2	~~W~~
Antimony trifluoride	1549	Corrosive	3	0	0	
Antimony trioxide			0	0	0	
ANTU	1651	Poison	4	1	0	
Aramite			1	1	0	
Argon	1006	Nonflammable gas	0	0	0	
Arsenic	1558	Poison	3	1	0	
Arsenic acid	1561	Poison	3	0	0	
Arsenic disulfide	1557	Poison	3	0	0	
Arsenic pentoxide	1559	Poison	3	0	0	
Arsenic trioxide	1561	Poison	3	0	0	
Arsenic trisulfide	1557	Poison	3	0	0	
Asbestos	2212	Class 9	2	0	0	
Asphalt	1999	Flammable	0	2	0	
Asphalt blending stocks: roofers flux	1999	Flammable	0	1	0	
Asphalt blending stocks: straight run residue	1999	Flammable	0	1	0	
Atrazine			1	0	0	
Auramine			2	1	0	
Barium	1400	Dangerous when wet	1	4	3	~~W~~

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

AMYLTRICHOLORSILANE

UN 1728

Shipping Name: Amyltricholorsilane
Other Names: Pentyltrichlorosilane
Trichloroamylsilane

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIGOROUSLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE VAPOR!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion products include toxic hydrogen chloride
- Corrosive to metals

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Pungent odor
- Sinks in water and reacts vigorously with water to form hydrochloric acid
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire, and conditions permit, DO NOT EXTINGUISH
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-72-2

HYDROGEN BROMIDE

UN 1048

Shipping Name: Hydrogen bromide, anhydrous
Other Names: Anhydrous hydrobromic acid

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure to the chemical occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Containers may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Reacts with water to produce toxic hydrobromic acid
- Reacts with metals to produce highly flammable hydrogen gas
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate and deny entry into the area of release or fire
- For containers exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- May be shipped as a pale yellow liquid under pressure
- Irritating odor
- Liquid sinks in water and dissolves in water with the production of heat and toxic hydrobromic acid
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- Boiling liquid may produce white vapor cloud

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10035-10-6

HYDROGEN FLUORIDE

(ANHYDROUS)

UN 1052

Shipping Name: Hydrogen fluoride, anhydrous
Other Names: Anhydrous hydrofluoric acid
Fluoric acid
HF
Hydrofluoric acid

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES BLINDNESS AND SEVERE BURNS WHICH MAY NOT BE IMMEDIATELY PAINFUL !
- Fire fighting gear including SCBA provides NO protection. If exposure to the chemical occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Container may BLEVE when exposed to fire
- Reacts with some metals to produce flammable and explosive hydrogen gas
- Highly corrosive attacking rubber, leather, glass and other materials
- Gas is slightly lighter than air

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless fuming liquid which boils at 67° F
- Sharp, irritating odor
- Initally sinks in water and is soluble in water producing toxic hydrofluoric acid and heat
- Nonflammable
- Gas is slightly lighter than air
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff and from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: skin burns can be treated with calcium gluconate gel

CAS: 7664-39-3

CYCLOHEXANONE

UN 1915

Shipping Name: Cyclohexanone

Other Names: Anone, Cyclohexylketone, Hexanon, Madone, Pimelic ketone, Sextone

Hazards:

- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs; prolonged contact will cause skin, eye and lung burns

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear to pale yellow oily liquid
- Peppermint-like odor
- Floats on the surface of water and is moderately soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-94-1

1,2-DIMETHOXYETHANE

UN 2252

Shipping Name: 1,2-Dimethoxyethane

Other Names: Ansul ether 121; Dimethyl cellosolve; 2,5-Dioxahexane; Ethanediol dimethyl ether; Ethylene glycol dimethyl ether; GDME; Glycol dimethyl ether; Glyme

Hazards:

- Highly flammable
- Irritating to lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sharp, ether-like smell
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-71-4

POTASSIUM PERSULFATE

UN 1492

Shipping Name: Potassium persulfate
Other Names: Anthion
Dipotassium persulfate
Potassium peroxydisulfate

WARNING! • STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Moderately irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Material will react with moisture in a closed container producing an explosive mixture of ozone and sulfuric acid
- Container may explode when exposed to fire
- Decomposition products upon heating include toxic sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless solid
- Odorless
- Sinks in water and is moderately soluble in water
- Nonflammable but may cause combustibles to burn

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7727-21-1

NITRIC ACID

UN 1760 (40% or less)
UN 2031 (Nonfuming greater than 40%)
UN 2032 (Fuming)

Shipping Name: UN 1760 Corrosive liquid, n.o.s.
UN 2031 Nitric acid other than red fuming, with more than 70% Nitric acid
UN 2032 Nitric acid, red fuming

Other Names: Aqua fortis
Hydrogen nitrate

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Corrosive to almost all metals releasing highly flammable hydrogen gas
- Reacts violently with water
- Decomposes upon heating to form highly toxic nitrogen oxides

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- A pale yellow to reddish brown liquid
- Choking odor
- Soluble in water giving off heat
- Nonflammable but may cause combustibles to ignite
- Vapors are heavier than air and will collect and stay in low areas
- Gives off a reddish brown vapor

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with ● If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7697-37-2

METHYL CHLORIDE

UN 1063

Shipping Name: Methyl chloride
Other Names: Arctic, Chloromethane, Freon 40, Monochloromethane, R40

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may explode or BLEVE when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Mildly irritating to skin, eyes, nose and lungs
- Exposure to the liquid may cause frostbite
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- May be shipped and stored as a liquefied compressed gas
- Faint sweet odor
- Liquid floats on the surface of water and boils; gas is slightly soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid below -11° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

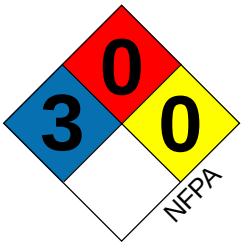
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-87-3



ARSENIC TRICHLORIDE

UN 1560

Shipping Name: Arsenic trichloride
Other Names: Arsenic butter
Arsenic chloride
Arsenous chloride
Arsenous trichloride

WARNING!
- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Severely irritating to skin, eyes, nose and lungs; prolonged contact with skin and eyes can cause burns
- Upon contact with water generates toxic hydrochloric acid
- Will react with most metals to produce explosive hydrogen gas
- Vapors are heavier than air and will collect and stay in low areas
- Decomposition products upon heating include toxic hydrogen chloride and arsenic fumes
- Known to cause cancer in humans following long term exposure: contact should be avoided

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to yellow oily liquid
- Pungent odor
- Decomposes in water to form toxic hydrochloric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn, fight surrounding fire with an agent appropriate for the material burning
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7784-34-1

ETHYLDICHLOROARSINE

UN 1892

Shipping Name: Ethyldichloroarsine
Other Names: Arsenic dichloroethane
Dichloroethylarsine
TL 214
ED

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Reacts with steam or acids producing highly toxic fumes

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid which may become yellow upon exposure to air or light
- Biting, irritating fruit-like odor
- Sinks in water and reacts with water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Used as a military poison gas

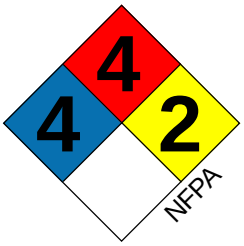
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician; treat as an arsine gas exposure

CAS: 598-14-1



ARSINE

UN 2188

Shipping Name: Arsine
Other Names: Arsenic hydride
Arsenic trihydride
Hydrogen arsenic

WARNING!
- POISON! BREATHING THE GAS OR SKIN CONTACT CAN KILLYOU!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:
- Exposure of cylinders to fire and flame or elevated temperatures may cause cylinder to rupture or frangible disc to burst, releasing entire contents of cylinder. Ruptured or venting cylinders may rocket through buildings and/or travel a considerable distance
- Vapors may travel long distances to ignition sources and flashback
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode
- Combustion products include toxic arsenic oxides
- Known to cause cancer in humans following long term exposure: contact should be avoided

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless gas
- Garlic-like odor
- Slightly soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of deforming), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Symptoms may be delayed
- Note to physician: causes hemolysis; chelating agents are not effective-if symptoms indicate, use exchange transfusion

CAS: 7784-42-1

1,1-DIMETHYLHYDRAZINE

UN 1163

Shipping Name: Dimethylhydrazine, unsymmetrical
Other Names: asym-Dimethylhydrazine
UDMH
DMH
unsym-Dimethylhydrazine

WARNING!
- POISON! BREATHING THE VAPORS, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- May interfere with the body's ability to use oxygen
- Severely irritating to skin, eyes, nose and lungs; can cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion and thermal decomposition products upon heating include toxic nitrogen oxides
- Corrosive to plastics

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Turns yellow and fumes upon contact with air
- Fishy ammonia-like odor
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Used as a high energy propellant for liquid fueled rockets

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

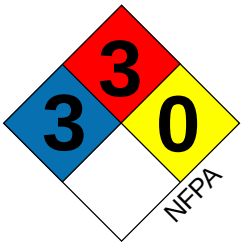
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 57-14-7



PYRIDINE

UN 1282

Shipping Name: Pyridine
Other Names: Azabenzene
Azine

Hazards:

- Moderately irritating to skin, eyes, nose and lungs; prolonged exposure can cause burns
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides
- Corrosive to some forms of rubber, plastics and coatings

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to slightly yellow liquid
- Powerful fish-like odor
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

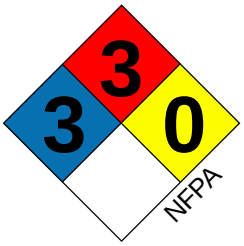
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-86-1



PIPERIDINE

UN 2401

Shipping Name: Piperidine
Other Names: Azacyclohexane
Cyclopentimine
Hexahydropyridine

Hazards:

- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Highly flammable
- Containers may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area around the release and deny entry
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fishy ammonia or pepper-like odor
- Initially floats on water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low area
- Freezes at 19° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-89-4

ETHYLENEIMINE

(INHIBITED)

UN 1185

Shipping Name: Ethyleneimine, inhibited

Other Names: Azacyclopropane, Azirane, Aziridine, Dimethylenimine, Ethylimine

WARNING!

- POISON! BREATHING THE VAPORS OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Containers may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic oxides of nitrogen

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless clear liquid
- Ammonia-like odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting burn
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If venting sound suddenly increases and/or unexpectedly stops, withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 151-56-4

SODIUM AZIDE

UN 1687

Shipping Name: Sodium azide
Other Names: Azide
Hydrazoic acid, sodium salt

WARNING! ● EXPLOSIVE! SHOCK OR HEAT MAY CAUSE MATERIAL TO EXPLODE!

Hazards:

- Breathing in the dust, swallowing the material or absorption through the skin can cause serious illness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may explode when exposed to fire
- Decomposition products upon heating include toxic hydrazoic acid fumes and nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Evacuate the immediate area and down wind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless solid
- No odor
- Initially sinks in water and is soluble in water
- Nonflammable

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- APPROACH FIRE WITH EXTREME CAUTION; consider letting fire burn
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 26628-22-8

METHYL PARATHION

UN 2783

Other Names: Azophos
Bladan-M
Dimethyl-p-nitrophenyl thiophosphate
Metaphos

WARNING! ● POISON! BREATHING THE VAPOR, SKIN OR EYE CONTACT, OR SWALLOWING THE MATERIAL CAN KILL YOU!
● Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may BLEVE or explode when exposed to fire
- Combustion products include toxic sulfur and phosphorous oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim!
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire or release and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- A white solid
- Faint garlic-like odor
- Sinks in water and is insoluble in water
- Flammable
- Melts at 99° F
- An organophosphate insecticide

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done wothout placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, initial treatment includes atropine

CAS: 298-00-0

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Barium carbonate	1564		2	0	0	
Barium chlorate	1445	Oxidizer	**2**	**0**	**1**	**OX**
Barium cyanide	1565	Poison	3	0	0	
Barium nitrate	1446	Oxidizer	2	0	0	OX
Barium perchlorate	1447	Oxidizer	2	0	0	OX
Barium permanganate	1448	Oxidizer	2	0	0	OX
Barium peroxide	1449	Oxidizer	3	0	1	OX
Benomyl			0	2	0	
Bentazon			2	2	0	
Benzene arsonic acid			4	1	0	
Benzene hexachloride	2729	Poison	2	0	0	
Benzene sulfonyl chloride	2225	Corrosive	3	1	1	
Benzidine	1885	Poison	2	1	0	
Benzo (A) anthracene			1	1	0	
Benzo (A) pyrene			2	1	0	
Benzo (B) fluoranthene			3	1	0	
Benzo (GHI) perylene			2	1	0	
Benzoic acid			**2**	**1**	**0**	
Benzophenone			1	1	0	
Benzoyl peroxide	2085		1	4	4	OX
Benzyl acetate			**1**	**1**	**0**	
Benzyl alcohol			**2**	**1**	**0**	
Benzyl amine			2	1	0	
Benzyl dimethyl amine	2619	Corrosive	2	2	0	
Benzyl dimethyl octadecyl ammonium chloride			1	1	0	
Benzyl iodide	2653	Poison		1	0	
Benzyl trimethyl ammonium chloride			1	1	0	
Benzyl violet			0	1	0	
Beryllium	1567	Poison	**3**	**1**	**0**	
Beryllium chloride	1566	Poison	2	0	2	₩
Beryllium fluoride	1566	Poison	2	0	0	
Beryllium nitrate	2464	Oxidizer	2	0	1	OX
Beryllium oxide	1566	Poison	2	0	0	
Beryllium sulfate	1566	Poison	2	0	0	
BHA			1	1	0	
BHC, alpha-			2	0	0	
BHC, beta-			1	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

DICHLOROMETHYL ETHER

UN 2249

Shipping Name: Dichloromethyl ether, symmetrical

Other Names: BCME
Bis(chloromethyl) ether
Chloro(chloromethoxy) methane
Chloromethyl ether

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Extremely irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Reacts with water to produce hydrochloric acid and formaldehyde
- Combustion products include toxic hydrogen chloride
- May form peroxides upon standing which will detonate with heat or shock
- Known to cause cancer in humans following long term exposure: contact should be avoided

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Suffocating odor
- Sinks in water and decomposes in water to form toxic hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 542-88-1

BUTADIENE

(INHIBITED)

UN 1010

Shipping Name: Butadienes, inhibited

Other Names: BD, Biethylene, Bivinyl, 1,3-Butadiene, Divinyl, Erythrene, Vinylethylene

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES LEADING TO TANK EXPLOSION!

Hazards:
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE or explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Colorless liquefied gas
- Pleasant gasoline-like odor
- Floats and boils on water and is insoluble in water
- Gas is heavier than air and will collect and stay in low areas
- Extremely flammable
- Becomes a liquid below 21° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If venting sound suddenly increases and/or unexpectedly stops, withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 106-99-0

BENZYLIDENE CHLORIDE

UN 1886

Shipping Name: Benzylidene chloride
Other Names: Benzal chloride
Benzyl dichloride
Benzylene chloride
Dichloromethyl benzene

Hazards:

- Severely irritating to skin, eyes, nose and lungs
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride
- Reacts with water to produce toxic hydrochloric acid

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to brown oily liquid
- Pungent odor
- Sinks in water and is insoluble in water
- Very flammable
- Reacts with water to produce hydrochloric acid
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 3° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 98-87-3

BENZALDEHYDE

UN 1990

Shipping Name: Benzaldehylde
Other Names: Benzenecarbonal
Benzene methylal
Benzoic aldehyde

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- Almond-like odor
- Sinks in water and is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -14°F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 100-52-7

2-CHLORO-BENZALMALONOITRILE

Other Names: o-Chlorobenzylidine malononitrile
CS

Hazards:	**Description:**
● Extremely irritating to skin, eyes and nose; prolonged contact can cause burns ● Container may explode when exposed to fire ● Combustion and decomposition products upon heating include toxic hydrogen cyanide	● White solid ● Pepper-like smell ● Insoluble in water ● Flammable ● Used as a tear gas and riot control agent
Awareness and Operational Level Training Response: ● Stay uphill and upwind ● Determine the extent of the problem ● Isolate the area of release or fire and deny entry ● For container exposed to fire evacuate the area in all directions because of the risk of explosion ● Notify local health and fire officials and pollution control agencies ● If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water	**Operational Level Training Response:** RELEASE, NO FIRE: ● Cover material to protect from wind, rain or spray ● Prevent runnoff from entering sewers and waterways if it can be done safely well ahead of the release FIRE: ● Use water to extinguish fire ● Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely ● If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 2698-41-1

BENZAMIDE

Other Names: Benzoic acid amide
Benzoylamide
Phenylcarboxyamide

Hazards:
- Mildly irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless solid crystals
- Odorless
- Sinks in water and is slightly soluble in water
- Flammable

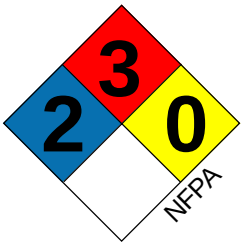
Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material burns with difficulty, fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 55-21-0 and 27208-38-4



BENZENE

UN 1114

Shipping Name: Benzene
Other Names: Benzol
Coal naphtha
Cyclohexatriene
Mineral naphtha

Hazards:

- Highly flammable
- Vapors may travel long distances to ignition sources and flash back
- Container may BLEVE when exposed to fire
- Vapors in confined areas (e.g., tanks, sewers buildings) may explode when exposed to fire
- Irritating to eyes, moderately irritating to skin and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Known to cause cancer in humans following long term exposure: contact should be avoided
- Corrosive to most rubber products

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pleasant aromatic odor
- Floats on water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

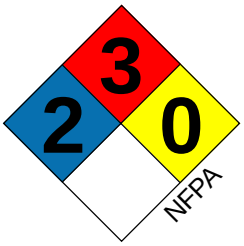
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 71-43-2



CHLOROBENZENE

UN 1134

Shipping Name: Chlorobenzene
Other Names: Benzene chloride
MCB
Monochlorobenzene
Phenyl chloride

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Combustion products include toxic hydrogen chloride and phosgene

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet almond-like smell
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Use foam or dry chemical if available in sufficient amounts; under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-90-7

FLUOROBENZENE

UN 2387

Shipping Name: Fluorobenzene
Other Names: Benzene fluoride
MFB
Monofluorobenzene
Phenyl fluoride

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen fluoride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, watery liquid
- Benzene-like odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 462-06-6

FLUOROACETIC ACID

UN 2642

Shipping Name: Fluoroacetic acid

Other Names: FAA, 2-Fluoroacetic acid, Fluoroethanoic acid, Monofluoroacetate, MFA

WARNING!
- POISON! BREATHING THE POWDER OR VAPOR, OR SWALLOWING THE POWDER CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Combustion or decomposition products upon heating include toxic hydrogen fluoride

Description:
- Colorless solid
- No odor
- Moderately soluble in water
- Flammable and burns with a green flame
- Melts at 95° F

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 144-49-0

PHENYL PHOSPHOROUS DICHLORIDE

UN 2798

Shipping Name: Phenyl phosphorous dichloride
Other Names: Benzene phosphorous dichloride
Dichlorophenyl phosphine Phenylphosphine dichloride

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIGOROUSLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE VAPORS!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion products include toxic hydrogen chloride
- Corrosive to most metals

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid that fumes in air
- Pungent odor
- Sinks in water and reacts in water to form toxic hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- DO NOT USE WATER DIRECTLY ON PRODUCT. Reacts vigorously with water to form toxic hydrochloric acid
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from rain or fire fighting from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to knock down vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If possible, do not allow water to come in contact with the material; if material is involved in a fire, use dry chemical to extinguish if available. If water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 644-97-3

CYCLOHEXANE

UN 1145

Shipping Name: Cyclohexane
Other Names: Benzenehexahydride
Hexahydrobenzene
Hexamethylene

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Petroleum-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 44° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-82-7

BENZONITRILE

UN 2224

Shipping Name: Benzonitrile
Other Names: Benzenenitrile
Cyanobenzene
Phenylcyanide

WARNING!
- POISON! BREATHING THE VAPOR, SWALLOWING THE LIQUID OR SKIN CONTACT CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs even at low concentrations
- Combustion products include toxic nitrogen oxides
- Corrosive to some plastics

Description:
- Colorless liquid
- Almond-like odor
- Sinks in water and is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 9° F

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways,notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a risk to the responder
- Decontaminate the vicitm from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity, if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 100-47-0

PHENYL MERCAPTAN

UN 2337

Shipping Name: Phenyl mercaptan
Other Names: Benzenethiol
Mercaptobenzene
Thiophenol

Hazards:

- May interfere with the body's ability to use oxygen
- Severely irritating to skin, eyes, nose and lungs; can cause burns or blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- Burnt rubber stench-like, or garlic-like odor
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 5° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

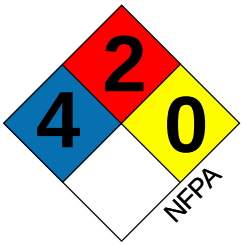
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 108-98-5



PHENOL

UN 1671 (Solid)
UN 2312 (Molten)
UN 2821 (Solution)

Shipping Name: Phenol

Other Names: Benzenol, Carbolic acid, Hydroxybenzene, Oxybenzene, Phenic acid, Phenyl alcohol, Phenylic acid

WARNING! • BREATHING THE VAPORS OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
• Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless solid or liquid that darkens pink to red on exposure to light
- Sweet medicinal odor
- Sinks in water and is moderately soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Solid material melts at 106° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover solid material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

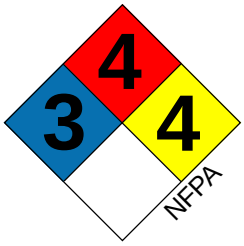
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-95-2



ETHYL NITRITE

(SOLUTIONS)

UN 1194

Shipping Name: Ethyl nitrite solutions
Other Names: Hyponitrous ether
Nitrous acid, ethyl ester
Sweet spirit of nitre

WARNING!
- EXTREMELY FLAMMABLE!
- EXPLOSIVE! DECOMPOSES EXPLOSIVELY AT 194°F!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Extremely irritating to skin, eyes, nose and lungs
- Containers may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- May interfere with the body's ability to use oxygen
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas above 63° F; colorless to pale yellow liquid below 63° F
- Sweet rum-like odor
- May be shipped and stored dissolved in ethyl alcohol
- Floats on the surface of water and is slightly soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 109-95-5

BENZOTRICHLORIDE

UN 2226

Shipping Name: Benzotrichloride

Other Names: Benzoic trichloride; Benzyl trichloride; Phenyl trichloromethane; Trichlorormethyl benzene; Trichlororortoluene

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Reacts with water to produce hydrochloric acid
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow, oily fuming liquid
- Pungent odor
- Sinks in water and reacts with water to form hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

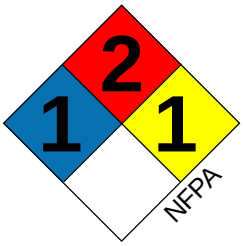
FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material, avoid using water if possible
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 98-07-7



BENZOQUINONE

UN 2587

Shipping Name: Benzoquinone
Other Names: 1,4-Benzoquinone
p-Benzoquinone
1,4-Cyclohexadiene dioxide
Quinone

Hazards:

- Container may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Greenish-yellow solid
- Chlorine-like odor
- Sinks in water and is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Use water or foam to extinguish
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 106-51-4

BENZYL CHLOROFORMATE

UN 1739

Shipping Name: Benzyl chloroformate
Other Names: Benzyl carbonyl chloride
Benzyl chlorocarbonate
BZCF

Hazards:

- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion and decomposition products upon heating include toxic hydrogen chloride
- Reacts vigorously with hot water or steam to form hydrochloric acid

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to pale yellow oily liquid
- Acrid odor
- Sinks in water and reacts slowly with cold water forming hydrochloric acid; reacts vigorously with hot water or steam
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If possible, DO NOT allow water to come in contact with material; if material is on fire, use dry chemical to extinguish; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 501-53-1

DIBENZYL ETHER

UN 3271

Shipping Name: Ethers, n.o.s.
Other Names: Benzyl ether
Benzyl oxide

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to pale yellow liquid
- Almond-like odor
- Floats on the surface of water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 38° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 103-50-4

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Brucine	1570	Poison	2	1	0	
Butanedione	2346	Flammable	1	3	0	
n-Butanol	1120	Flammable	1	3	0	
sec-Butanol	1120	Flammable	1	3	0	
1,4-Butenediol			1	1	0	
Butyl acid phosphate	1718	Corrosive	2	1	1	
n-Butyl alcohol	1120	Flammable	1	3	0	
sec-Butyl alcohol	1120	Flammable	1	3	0	
sec-Butylamine			3	3	0	
n-Butylaniline	2738	Poison	3	1	0	
Butylated hydroxyanisole			1	1	0	
Butyl benzyl phthalate			1	1	0	
Butyl butyrate			2	2	0	
n-Butyl chloroformate	2743	Poison	2	3	1	
Butyl, decyl, cetyl-eicosyl methacrylate			2	2	0	
2,3-Butylene oxide			2	3	2	
Butyl ether	1149	Flammable	2	3	1	
tert-Butyl ether	1149	Flammable	2	3	1	
Butyl isovalerate			0	2	0	
n-Butyl methacrylate	2227	Flammable	2	2	0	
Butyl methyl ether	2350	Flammable	1	2	0	
Butyl nitrite	2351	Flammable	2	2	0	
tert-Butyl peroxybenzoate	2097		1	3	4	OX
p-tert-Butyl phenol	2229	Poison	1	1	0	
Butyl toluene	2667	Poison	2	2	0	
n-Butyric acid	2820	Corrosive	3	2	0	
beta-Butyrolactone			0	1	0	
Cacodylic acid	1572	Poison	1	0	0	
Cadmium(powder)			2	2	0	
Cadmium acetate			2	0	0	
Cadmium bromide			2	0	0	
Cadmium chloride			2	0	0	
Cadmium fluoroborate			2	0	0	
Cadmium nitrate			2	0	0	OX
Cadmium oxide			2	0	0	
Cadmium stearate			2	1	0	
Cadmium sulfate			2	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

CHLOROPRENE

(INHIBITED)

UN 1991

Shipping Name: Chloroprene, inhibited

Other Names: beta-Chloroprene; 2-Chlorobuta -1,3-diene; Chlorobutadiene; Neoprene; 2-Chloro-1,3-butadiene

WARNING! • MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from rain or firefighting from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting suddenly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 126-99-8

CROTONALDEHYDE

(STABILIZED)

UN 1143

Shipping Name: Crotonaldehyde, stabilized

Other Names:		
	2-Butenal	Crotonaldehyde (E)
	trans-2-Butenal	Diproanoate
	Crotonal	beta-Methyl acrolein

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Severely irritating to skin, nose, eyes and lungs; skin and eye contact can cause severe burns and blindness
- May react with itself with explosive violence when heated or exposed to alkalis
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Forms explosive peroxides upon exposure to air
- Vapors are heavier than air will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear to yellow liquid
- Pungent suffocating tar-like odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 4170-30-3

PROPIOLACTONE

Other Names: BPL
2-Oxetanone
3-Propanolide
beta-Propiolactone

Hazards:

- Extremely toxic when inhaled
- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact can cause burns and blindness
- Vapors are heavier than air and will collect and stay in low areas
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Chemical reaction of compound upon storage may plug release vents causing a violent explosion

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent smell
- Initially sinks in water and is soluble in water
- Reacts slowly with water to form less toxic materials
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 57-57-8

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
BHC, delta-			1	0	0	
BHC, gamma-			3	0	0	
Biphenyl			2	1	0	
Bis-(2-chloroethoxy) methane			2	1	0	
Bis-(2-chloroisopropyl) ether	2490	Poison	2	2	0	
Bis-(2-chloro-1-methyl ethyl) ether	2490	Poison	2	2	0	
Bis-(2-ethyl hexyl) adipate			0	1	0	
Bis-(2-ethyl hexyl) phthalate			0	1	0	
Bismuth oxychloride			0	0	0	
Bisphenol A			1	1	0	
Bisphenol A diglycidyl ether			1	1	0	
Bithionol			3	1	0	
Bitoscanate			2	1	0	
Black powder, compressed	0028	1.1D Explosive	1	3	4	
Black powder, granular	0027	1.1D Explosive	1	3	4	
Black powder, pellets	0028	1.1D Explosive	1	3	4	
Bolero			1	1	0	
Boric acid			0	0	0	
Borneol	1312	Flammable solid	2	2	0	
Boron trifluoride: dimethyl etherate	2965	Dangerous when wet	4	4	1	
Bromacil			1	0	0	
Bromadiolone			4	1	0	
Bromine chloride	2901	Poison gas	3	0	2	OX
Bromoacetic acid	1938	Corrosive	2	1	0	
Bromoacetone	1569	Poison	2	2	0	
2-Bromobutane	2339	Flammable	2	3	0	
Bromochloromethane	1887	Keep away from food	1	0	0	
2-Bromoethyl ethyl ether	2340	Flammable	2	3	0	
Bromoform	2515	Poison	1	0	0	
1-Bromo-3-methylbutane	2341		1	3	0	
2-Bromopentane			1	3	0	
4-Bromophenyl phenyl ether			1	1	0	
1-Bromopropane			2	3	0	
Bromotrifluoroethylene	2419	Flammable gas	3	4	1	
Bromotrifluoromethane	1009	Nonflammable gas	1	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

n-BUTYL ISOCYANATE

UN 2485

Shipping Name: n-Butyl isocyanate
Other Names: BIC
Butyl isocyanate
1-Isocyanobutane

Hazards:

- Severely irritating to skin, eyes, nose and lungs; prolonged contact with skin or eyes can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- No odor found
- Floats on the surface of water and is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

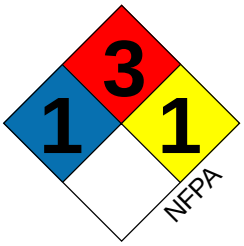
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 111-36-4



DICYCLOPENTADIENE

UN 2048

Shipping Name: Dicyclopentadiene
Other Names: Bicylcopentadiene
1,3-CPD
1,3-Cyclopentadiene dimer
DCP

Hazards:

- Highly flammable
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release of liquid
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless crystalline solid or liquid
- Sweet, sharp camphor-like odor
- Liquid floats on the surface of water; the solid sinks in water; is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Melts at 90° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover solid material to protect from wind, rain or spray
- Prevent liquid material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

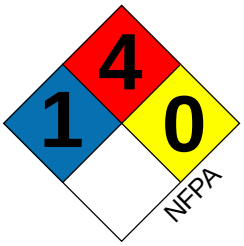
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid or solid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 77-73-6



ETHANE

UN 1035 (Compressed gas)
UN 1961 (Refrigerated liquid)

Shipping Names: UN 1035 Ethane, compressed
UN 1961 Ethane, refrigerated liquid

Other Names: Bimethyl Methylmethane
Dimethyl

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode with or without ignition
- Contact with liquid may cause frostbite

Description:

- Colorless, odorless gas
- Shipped and stored as a compressed gas or cryogenic liquid
- Boils on the surface of water and is insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- May produce a visible vapor cloud

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

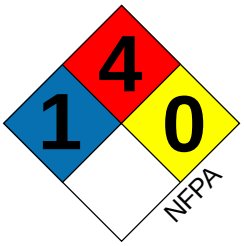
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-84-0



METHANE

UN 1971 (Compressed gas)
UN 1972 (Cryogenic liquid)

Shipping Name: UN 1971 Methane, compressed
UN 1972 Methane, refrigerated liquid (cryogenic liquid)

Other Names: Biogas, Fire damp, Marsh gas, Methyl hydride, Natural gas, R50

WARNING!
- EXTREMELY FLAMMABLE!
- CYLINDERS EXPOSED TO FIRE OR FLAME MAY RUPTURE AND ROCKET THROUGH BUILDING!

Hazards:
- Gas may travel long distances to ignition sources and flash back
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Gas is lighter than air but will collect and stay in low areas
- Contact with liquid may cause frostbite

Description:
- Colorless gas
- No odor, or with a weak skunk-like odor
- Shipped and stored as a compressed gas or cryogenic liquid
- Liquid floats and boils on the surface of water; is insoluble in water
- Extremely flammable
- Gas is lighter than air but will collect and stay in low areas

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-82-8

DIEPOXYBUTANE

Other Names: Bioxirane
Butadiene diepoxide
Butadiene dioxide
1,2,3,4-Diepoxybutane

Hazards:

- Severely irritating to skin, eyes, nose and lungs
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -2° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed

CAS: 1464-53-5

1,3-DICHLOROACETONE

UN 2649

Shipping Name: 1,3-Dichloroacetone
Other Names: Bis (chloromethyl) ketone
1,3-Dichloro-2-propanone

Hazards:

- Highly irritating to skin, eyes, nose and lungs; can cause burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion and decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Crystalline solid
- No odor found
- Sinks in water and is moderately soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Melts at 113° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 534-07-6

2,2'-DICHLORODIETHYL ETHER

UN 1916

Shipping Name: 2,2'-Dichlorodiethyl

Other Names: Bis-(2-chloroethyl) ether; Chlorex; DCEE; Dichloroether; Dichloroethyl ether; 1,1-Oxy-bis-(2-chloroethane)

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride
- Explosive peroxides may form in open containers upon standing

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear colorless liquid
- Sweet nauseating odor
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Symptoms may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 111-44-4

MECHLORETHANAMINE

UN 1955

Other Names: Bis(2-chloroethyl) methylamine; HN_2; MBA; Mustargen; Mustine; Nitrogen mustard; N-lost

WARNING! ● POISON! BREATHING THE VAPOR OR SWALLOWING THE MATERIALCAN KILL YOU! SKIN OR EYE CONTACT CAUSES SEVERE BURNS OR BLINDNESS!
● Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides and hydrogen chloride

Description:
- A liquid
- Faint fish-like odor
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Used as a blister-type war gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area of release or fire, deny entry and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

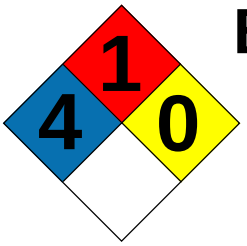
Operational Level Training Response:

RELEASE, NO FIRE:
- BACK OFF! - Isolate a wide area around the release and call for expert help
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemcial if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely.
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location
- Use unattended equipment whenever possible

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 51-75-2



BIS(2-CHLOROETHYL) SULFIDE

Other Names: Distilled mustard, H, HD, Mustard gas, Mustard HD, Sulfur mustard, Yperite

WARNING! ● POISON! BREATHING THE VAPOR, OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
● Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride and sulfur oxides
- Known to cause cancer in humans following long term exposure; contact should be avoided

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless or amber to black oily liquid
- Weak sweet odor like garlic or horseradish
- Reacts with water to form toxic materials; sinks in water and is slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Forms yellow crystals on cooling; becomes a yellow solid below 57° F
- Used as a blister type war gas

Operational Level Training Response:

RELEASE, NO FIRE:
- BACK OFF! - Isolate a wide area around the release and call for expert help
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location
- Use unattended equipment whenever possible

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 505-60-2

TETRAETHYL PYROPHOSPHATE

NA 2783 (Solid)
NA 3018 (Liquid)

Shipping Name: Tetraethylpyrophosphate

Other Names:		
	Bis-O,O-diethylpyrophosphoric anhydride	TEP
	Fosvex	TEPP
	Pyrophosphoric acid, tetraethyl ester	Vapotone

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic phosphorous oxides or explosive ethylene gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to amber liquid
- Fruit-like odor
- Reacts with water to form corrosive phosphoric acid and flammable ethylene gas and is soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 32° F
- An organophosphate insecticide

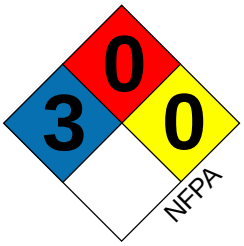
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If material is on fire or involved in a fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding),withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, atropine is an initial antidote

CAS: 107-49-3



SULFUR DIOXIDE

(LIQUEFIED)

UN 1079

Shipping Name: Sulfur dioxide, liquefied

Other Names: Bisulfite; Sulfur oxide; Sulfurous oxide; Sulfurous anhydride; Sulfurous acid anhydride

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Reacts with water to form corrosive sulfurous acid
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- Sharp pungent odor
- Shipped and stored as a compressed liquefied gas
- Liquid sinks in water and boils forming toxic sulfurous acid
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid below 14° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material do not allow water to come in contact with the material. If material is involved in a fire, use dry chemical to extinguish; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7446-09-5

SODIUM HYPOCHLORITE

UN 1791 (Solution)

Shipping Name: Hypochlorite solution, with more than 5% available chlorine
Hypochlorite solution, with 16% or more available chlorine

Other Names: B-K Liquid; Bleach; Clorox; Dakins solution; Hypochlorite; Sodium hypochlorite solution

Hazards:

- Very irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Container may explode or BLEVE when exposed to fire; solutions release oxygen upon storage
- Combustion products include toxic caustic fumes
- Corrosive to aluminum

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Greenish-yellow solid but usually found as a colorless to yellow solution in water
- Bleach-like odor
- Soluble in water
- Nonflammable

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7681-52-9

PARATHION

UN 2783 (Mixture)

Other Names: Bladan
DDP
Diethyl p-nitrophenyl thiophosphate
Fostox
Thiophos

WARNING! • POISON! BREATHING THE VAPOR, SKIN OR EYE CONTACT, OR SWALLOWING THE MATERIAL CAN KILL YOU!
• Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic sulfur and phosphorous oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim!
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire or release and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- A yellow liquid
- Faint garlic-like odor
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 43° F
- An organophosphate insecticide used as a war nerve gas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done wothout placing personnel at risk

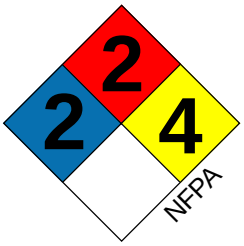
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, initial treatment includes atropine

CAS: 56-38-2



NITROGLYCERIN

UN 0143 (Desensitized)
UN 0144 (1 to 10% Solution in alcohol)
UN 1204 (Not more than 1% Solution in alcohol)
UN 3064 (1 to 5% Solution in alcohol)

Shipping Name: Nitroglycerin
Other Names: Blasting oil
Glycerol trinitrate
Trinitroglycerin

WARNING! ● EXPLOSIVE! SHOCK AND HEAT SENSITIVE!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Pale yellow oily liquid
- No odor
- Sinks in water and is slightly soluble in water
- Very flammable
- May be dissolved in flammable or water soluble solvents
- Freezes at 56° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 55-63-0

SULFOLANE

Other Names: Bondolane A
Sulfolane-W
Tetrahydrothiophene-1
Tetramethylene sulfone
Thiolane-1,1-dioxide
Thiophan sulfone

Hazards:
- Container may BLEVE or explode when exposed to fire
- Irritating to nose, eyes and lungs

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- Solid is odorless, liquid has slight oil-like odor
- Initially liquid sinks in water and dissolves in water
- Flammable
- Becomes a liquid at 81° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, container discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 126-33-0

DIBORANE

UN 1911

Shipping Name: Diborane
Other Names: Boroethane
Boron hydride
Diboron hexahydride

WARNING!

- POISON! BREATHING THE GAS CAN KILL YOU!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE! WILL IGNITE WITHOUT WARNING IN MOIST AIR AT ROOM TEMPERATURE!
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO PRODUCE FLAMMABLE HYDROGEN GAS!

Hazards:

- Reacts violently with halogenated hydrocarbons (Halon)
- Gas may travel long distances to ignition sources and flash back
- Gas is heavier than air and will collect and stay in low areas
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Containers may explode when exposed to heat or fire
- Severely irritating to skin, eyes, nose and lungs; skin and eye contact can couse severe burns and blindness
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless compressed gas
- Sweet, repulsive odor
- Decomposes in water rapidly to form flammable hydrogen gas
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 19287-45-7

BORON TRIBROMIDE

UN 2692

Shipping Name: Boron Tribromide
Other Names: Boron bromide
Tribromoborane
Trona

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROBROMIC ACID FUMES!

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Strongly corrosive to metal, wood and rubber

Awareness and Operational Training Level Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless, fuming liquid
- Sharp, irritating odor
- Reacts violently with water to form toxic hydrobromic acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Do not allow material to come in contact with the material; if material is on fire, use dry chemical to extinguish; fight surrounding fire with agent other than water or foam
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10294-33-4

BORON TRICHLORIDE

UN 1741

Shipping Name: Boron trichloride
Other Names: Boron chloride
Trichloroborane
Trichloroboron

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! PROLONGED SKIN CONTACT CAN CAUSE SEVERE BURNS OR BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIGOROUSLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE

Hazards:

- Severely irritating to nose and lungs
- Container may explode when exposed to fire
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Contact with liquid can cause frostbite
- Decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Container may BLEVE or explode when exposed to fire
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas or liquid
- Shipped and stored as a compressed liquefied gas
- Sharp, choking acrid odor
- Reacts vigorously with water to produce hydrochloric acid
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- Liquid boils at 54° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

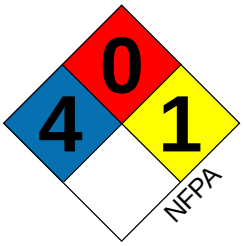
FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material - DO NOT ALLOW WATER TO COME IN CONTACT WITH MATERIAL
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10294-34-5



BORON TRIFLUORIDE

UN 1008

Shipping Name: Boron trifluoride
Other Names: Boron fluoride
Trifluoroboron

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Container may explode when exposed to fire
- Reacts with water or moist air to produce hydrofluoric acid
- Combustion and decomposition products upon heating include the toxic gases hydrogen fluoride and fluorine
- Will attack some plastics and rubber coatings
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless compressed gas
- Pungent and irritating odor, may be considered pleasant at low concentrations
- Forms a dense white aerosol mist upon contact with moist air
- Reacts with water to form toxic hydrofluoric acid
- Soluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- May be stored as an ethyl ether complex that will increase flammability

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Victims should be examined by a physician as soon as possible
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7637-07-2

DECABORANE

UN 1868

Shipping Name: Decaborane
Other Names: Boron hydride
Decaborane (14)
Decaborane tetrahydride

WARNING!
- POISON! BREATHING THE DUST OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Skin and eye contact causes severe burns and blindness
- Container may explode when exposed to fire
- Reacts explosively with halogenated hydrocarbons (Halons) or oxidizers
- Vapors are heavier than air and will collect and stay in low areas
- Releases flammable hydrogen gas upon contact with hot water
- Combustion products include toxic borane oxides
- Will attack some plastics and rubbers

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White to colorless solid
- Sharp, pungent chocolate-like odor
- Floats on the surface of water and is slightly soluble in water
- Very flammable; burns with a green colored flame
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

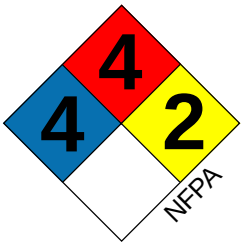
FIRE:

- Use water spray using unattended monitors to extinguish fire. Dry sand or dry chemical may be used if available in sufficient amounts. Avoid the use of carbon dioxide, Halon or Halocarbon extinguishers
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 17702-41-9



PENTABORANE

UN 1380

Shipping Name: Pentaborane
Other Names: Boron hydride
Pentaborane monohydride

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE LIQUID OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE ! MAY IGNITE OR EXPLODE SPONTANEOUSLY UPON CONTACT WITH MOIST AIR!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Extremely irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors may accumulate in air or confined spaces and explode
- Reacts violently with halogenated (Halon) extinguishing agents

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent sour milk-like odor
- Floats on water and is insoluble in water; decomposes slowly in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Spills may ignite spontaneously
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire, and conditions permit, DO NOT EXTINGUISH
- Do not use halogenated (Halon) extinguishing agents
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder. Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 19624-22-7

LIQUEFIED PETROLEUM GAS

(LPG)

UN 1075

Shipping Name: Liquefied petroleum gas

Other Names: Bottled gas LPG
Petroleum gas, liquefied

WARNING! ● EXTREMELY FLAMMABLE!
● CONTAINERS MAY BLEVE OR EXPLODE WHEN EXPOSED TO HEAT OR FLAMES!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For containers exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas
- May be shipped and stored as a compressed liquefied gas
- Extremely flammable
- No odor unless treated with an odorant
- Floats and boils on the surface of water and is insoluble in water
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

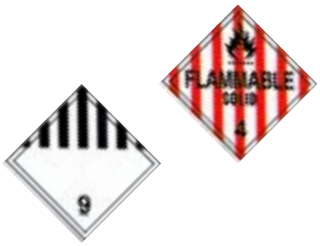
First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 68476-85-7

SULFUR

UN 2448 (Molten)
UN 1350
Shipping Name: UN 2448 Sulfer, molten
UN 1350 Sulfer
Other Names: Brimstone



WARNING!
- TANKS OF MOLTEN SULFUR MAY CONTAIN TOXIC AND FLAMMABLE HYDROGEN SULFIDE GAS UNDER PRESSURE!
- COMBUSTION PRODUCES LARGE QUANTITIES OF HIGHLY TOXIC SULFUR DIOXIDE GAS!

Hazards:
- Irritating to skin, eyes, nose and lungs; molten material will cause burns
- Fires may be difficult to extinguish
- Hot molten sulfur will form a solid crust as it cools, liquid below will remain hot for an extended time
- Flames of burning sulfur may be difficult to see in daylight
- Container may BLEVE or explode when exposed to fire

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate a wide area around the release, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- If material is on fire, evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Yellow solid
- May have a faint rotten-egg odor
- Sinks in water and is insoluble in water
- Flammable
- May be shipped in molten form at temperatures between 280° F and 300° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- For a small release, a carbon dioxide extinguisher may be used to cool and solidify molten material
- Allow the molten material to cool and solidify
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Use water or foam to extinguish
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7704-34-9

BROMINE

UN 1744

Shipping Name: Bromine or Bromine, solution

Other Names: Brom

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- When heated will react with water or steam to produce toxic and corrosive fumes

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water
- Notify local health and fire officials and pollution control agencies

Description:

- Fuming red crystals at low temperatures
- A reddish brown fuming liquid above 19° F
- Sharp penetrating odor
- Sinks in water forming hydrobromic acid and is soluble in water
- Nonflammable
- Strong oxidizing agent
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate the building and confine vapors by closing doors and shutting down HVAC systems

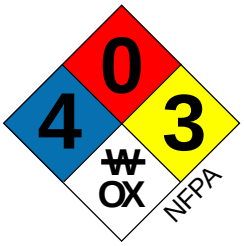
FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7726-95-6



BROMINE PENTAFLUORIDE

UN 1745

Shipping Name: Bromine pentafluoride
Other Names: Bromide fluoride

WARNING!

- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER RELEASING TOXIC HYDROFLUORIC ACID!
- STRONG OXIDIZER - WILL INCREASE THE INTENSITY OF A FIRE; MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Reacts violently with many metals, glass, wood and some plastics
- Decomposes upon heating to produce highly toxic hydrogen fluoride and hydrogen bromide gas

Awareness and Operational Level Training Response

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to pale yellow fuming liquid
- Pungent, highly irritating odor
- Reacts violently with water forming highly toxic hydrofluoric acid
- Nonflammable, but may ignite other flammable materials
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: skin burns can be treated with calcium gluconate gel

CAS: 7789-30-2

CYANOGEN BROMIDE

UN 1889

Shipping Name: Cyanogen bromide
Other Names: Bromine cyanide
Bromocyan
Cyanobromide

WARNING! • POISON! BREATHING THE VAPORS, SKIN CONTACT OR SWALLOWING THE SOLID CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
• Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns and blindness
- Vapors are heavier than air and will collect and stay in low areas
- Decomposes rapidly in acid or slowly in water to produce toxic hydrogen cyanide, bromine gas and hydrogen bromide; decomposes in fire to produce nitrogen oxides and hydrogen bromide
- Container may explode when exposed to fire

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless solid
- Pungent, unpleasant odor
- Soluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Solid produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- If material is involved in a fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors. If fire must be extinguished use an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 506-68-3

BROMINE TRIFLUORIDE

UN 1746

Shipping Name: Bromine trifluoride
Other Names: Bromine fluoride

WARNING!

- POISON! BREATHING THE GAS OR SWALLOWING THE LIQUID CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER EVEN AT VERY LOW TEMPERATURES PRODUCING TOXIC HYDROGEN FLUORIDE VAPORS!
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE AND MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Vapors and fumes are heavier than air and will collect and stay in low areas
- Exposure of cylinders to fire and flame or elevated temperatures may cause cylinders to rupture or frangible disc to burst, releasing entire contents of cylinder. Ruptured or venting cylinders may rocket through buildlings and/or travel a considerable distance
- Reacts with acids to produce toxic bromine and fluorine fumes
- Decomposes upon heating to produce toxic hydrogen bromide and hydrogen fluoride fumes
- Reacts violently with many metals, glass, wood and some plastics
- Corrosive to many common metals and glass

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to pale yellow fuming liquid
- Pungent irritating odor
- Reacts violently with water to produce toxic hydrogen fluoride fumes
- Nonflammable but may cause combustibles to ignite
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 48° F
- Produces large amounts of vapors

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- If possible do not allow water to come in contact with the material. Material does not burn; fight surrounding fire with an appropriate agent, if water must be used, use it in flooding quantites
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Ingestion - do not induce vomiting
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 7787-71-5

BROMOACETYL BROMIDE

UN 2513

Shipping Name: Bromoacetyl bromide
Other Names: Bromoethanoyl bromide

WARNING! ● AVOID THE USE OF WATER! REACTS VIGOROUSLY WITH WATER PRODUCING TOXIC HYDROGEN BROMIDE VAPORS!

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; can cause burns and blindness.
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposes upon heating to produce toxic hydrogen bromide vapors

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- Sharp, pungent extremely irritating odor
- Sinks in water and reacts vigorously with water to form toxic hydrobromic acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- If possible do not allow water to come in contact with the material. Material does not burn; fight surrounding fire with an appropriate agent. If water must be used, use it in flooding quantites
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 598-21-0

BROMOBENZENE

UN 2514

Shipping Name: Bromobenzene
Other Names: Phenyl bromide

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Combustion products include toxic hydrogen bromide vapors

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Aromatic odor
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS 108-86-1

1-BROMOBUTANE

UN 1126

Shipping Name: n-Butyl bromide
Other Names: Butyl bromide

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Combustion products include toxic hydrogen bromide vapors

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to pale straw colored liquid
- No odor found
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Use foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 109-65-9

VINYL BROMIDE

(INHIBITED)

UN 1085

Shipping Name: Vinyl bromide, inhibited
Other Names: Bromoethene
Bromoethylene

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers buildings) may explode when exposed to fire
- Very irritating to skin, eyes, nose and lungs
- Contact with liquid may cause frostbite
- Combustion or decomposition products upon heating include toxic hydrogen bromide

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- Pungent odor
- Insoluble in water and liquid sinks in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- A liquid below 60° F
- May be shipped and stored as a liquid under pressure

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse the gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

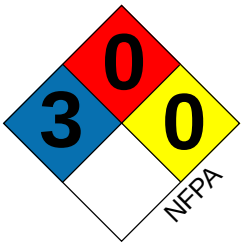
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to direct flame or elevated temperatures, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Prolonged contact with skin can cause burns

CAS: 593-60-2



ETHYLENE DIBROMIDE

UN 1605

Shipping Name: Ethylene dibromide

Other Names: Bromofume, EDB, 1,2-Dibromoethane, Ethylene bromide, Dibromoethane, Unifume, Dowfume

Hazards:

- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin will cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen bromide
- Corrosive to some plastics and rubber

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless heavy liquid
- Sweet odor
- Sinks in water and is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 50° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 106-93-4

METHYL BROMIDE

UN 1062

Shipping Name: Methyl bromide

Other Names: Brom-O-Gas, Bromomethane, Dowfume, Halon 1001, MB

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Very irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Gas is heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Exposure to the liquid may cause frostbite
- Reacts with aluminum to produce spontaneously combustible compounds
- Combustion products include toxic hydrogen bromide

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- Shipped and stored as a liquefied gas
- Sweet chloroform-like odor
- Sinks in water and is slightly soluble in water
- Flammable
- Gas is heavier than air and will collect and stay in low areas
- A liquid below 38° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-83-9

2-BROMOPROPANE

UN 2344

Shipping Name: 2-Bromopropane
Other Names: Isopropyl bromide
Propyl bromide

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic hydrogen bromide gas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Use foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 75-26-3

3-BROMOPROPYNE

UN 2345

Shipping Name: 3-Bromopropyne
Other Names: Bromopropyne
Propargyl bromide

WARNING! • EXPLOSIVE! MATERIAL IS PRESSURE AND SHOCK SENSITIVE AND WILL EXPLODE!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and throughly decontaminate personnel
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen bromide

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate a wide area around the release and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Sharp, pungent odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 106-96-7

BUTYRALDEHYDE

UN 1129

Shipping Name: Butyraldehyde

Other Names: Butal, Butaldehyde, Butanal, Butyl aldehyde, Butyral, Butyric aldehyde

Hazards:

- Severely irritating to skin, eyes, nose and lungs
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Pungent, suffocating odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Forms explosive peroxides upon exposure to air and excessive heat
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 123-72-8

BUTANE

UN 1011

Shipping Name: Butane or Butane mixture
Other Names: Diethyl
n-Butane

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings)
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless compressed gas
- Odor of natural gas
- The liquid floats on water and boils; the gas is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Liquid below 30° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 106-97-8

BUTYRONITRILE

UN 2411

Shipping Name: Butyronitrile
Other Names: Butane nitrile
Butyric acid nitrile
Propyl cyanide

WARNING!
- POISON! BREATHING THE VAPORS, SKIN CONTACT OR SWALLOWING THE LIQUID CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Severely irritating to skin, eyes, nose and lungs
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Reacts with acids producing toxic hydrogen cyanide
- Combustion products include toxic nitrogen oxides and cyanide

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sharp, suffocating odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn - produces cyanide gas under fire conditions
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- For skin burns decontaminate with water and apply a clean dry dressing
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity, if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS 109-74-0

BUTYL MERCAPTAN

UN 2347

Shipping Name: Butyl mercaptans
Other Names: 1-Butanethiol
Butanethiol
n-Butyl mercaptan
Thiobutyl alcohol

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) May explode when exposed to fire
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition source
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Obnoxious garlic-like odor
- Insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

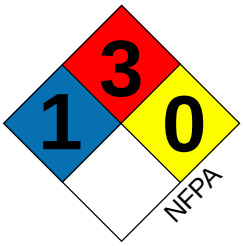
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding) withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 109-79-5



METHYL ETHYL KETONE

UN 1193

Shipping Name: Methyl ethyl ketone or Ethyl methyl ketone
Other Names: 2-Butanone
MEK

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet odor like fingernail polish (acetone)
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 78-93-3

BUTYRYL CHLORIDE

UN 2353

Shipping Name: Butyryl chloride
Other Names: Butanoyl chloride
Butyric acid chloride
Butyric chloride

Hazards:

- Severely irritating to skin, eyes, nose and lungs - can cause burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sharp, irritating odor
- Sinks in water and dissolves slowly in water
- Decomposes in water to form toxic hydrogen chloride gas
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

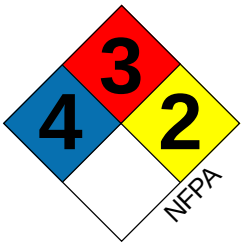
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 141-75-3



METHYL VINYL KETONE

UN 1251

Shipping Name: Methyl vinyl ketone
Other Names: 3-Buten-2-one
Methylene acetone
MVK
Vinyl methyl ketone

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Description:
- Colorless to light yellow liquid at room temperature
- Strong irritating odor
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 20° F

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

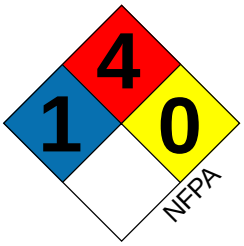
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 78-94-4



BUTYLENE

UN 1012

Shipping Name: Butylene

Other Names: Butene, n-Butylene, cis-Butene, trans-Butene, n-Butene

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless compressed liquefied gas
- Faint petroleum-like odor
- Boils on the surface of water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 25167-67-3

1,2-BUTYLENE OXIDE

(STABILIZED)

UN 3022

Shipping Name: 1,2-Butylene oxide, stabilized
Other Names: 1-Butene oxide
1-Butylene oxide
1,2-Epoxybutane

Hazards:

- May react with itself without warning blocking relief valves leading to container explosion
- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- May react violently with acids and certain other metal catalysts

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Disagreeable odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 106-88-7

t-BUTYL ALCOHOL

UN 1120

Shipping Name: Butanols
Other Names: t-Butanol
Butyl alcohol

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Camphor-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes below 75° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

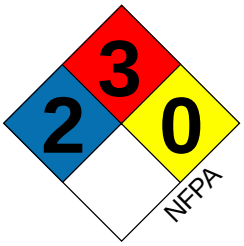
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 75-65-0



CHLOROBUTANE

UN 1127

Shipping Name: Chlorobutanes
Other Names: Butyl chloride
n-Butylchloride
1-Chlorobutane

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Unpleasant odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-69-3

HEXENE

UN 2370

Shipping Name: 1-Hexene
Other Names: Butyl ethylene
1-Hexene
Hexylene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 592-41-6

CAPROIC ACID

UN 2829

Shipping Name: Caproic acid
Other Names: Butylacetic acid
Capronic acid
Hexanoic acid

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow oily liquid
- Goat or Limburger cheese-like odor
- Floats on the surface of water and is slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 26° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

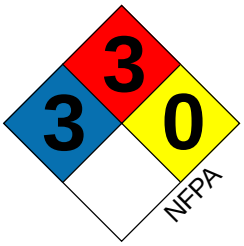
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS 142-62-1



ETHYLBUTYLAMINE

UN 2733

Shipping Name: Amines, liquid, corrosive, flammable, n.o.s.
Other Names: Butylethylamine
N-ethylbutylamine

WARNING! ● POISON! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
● Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Severely irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Ammonia-like odor
- Floats on the surface of water and may dissolve in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 13360-63-9

BUTYLTRICHLOROSILANE

UN 1747

Shipping Name: Butyltrichlorosilane
Other Names: Butylsilicon trichloride
Trichlorobutylsilane

Hazards:

- Severely irritating to skin and eyes; can cause severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Reacts vigorously with water to form toxic hydrogen chloride
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent odor
- Sinks in water and reacts vigorously with water to form toxic hydrochloric acid
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS 7521-80-4

1,4-BUTYNEDIOL

UN 2716

Shipping Name: 1,4-Butynediol
Other Names: 2-Butyne-1,4-diol
2-Butynediol
Butynediol
1,4-Dihydroxy-2-butyne

Hazards:

- Severely irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White to light yellow solid
- No odor found
- Initally floats on the surface of water and is soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

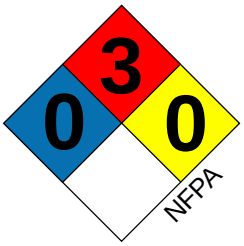
FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding) withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS 110-65-6



ETHYL BUTYRATE

UN 1180

Shipping Name: Ethyl butyrate
Other Names: Butyric acid, ethyl ester
Ethyl butanoate

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fruity, pineapple-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 105-54-4

METHYL BUTYRATE

UN 1237

Shipping Name: Methyl butyrate
Other Names: Butyric acid, methyl ester
Methyl-n-butanoate
Methyl-n-butyrate

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Apple-like odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 623-42-7

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Chlorotrifluoromethane	1022	Nonflammable gas	1	0	0	
Chloroxuron			3	0	0	
Chlorthiophos			3	1	0	
Chromic acetate	9101		1	0	0	
Chromic acid	1755	Corrosive	3	0	0	OX
Chromic anhydride	1463	Oxidizer	1	0	2	OX
Chromic sulfate	9100		1	0	0	
Chromium (dust)			0	1	0	
Chromium oxychloride	1758	Corrosive	1	0	2	OX,₩
Chromous chloride	9102		1	0	0	
Chrysene			1	1	0	
C.I. acid blue 9, diammonium salt			0	1	0	
C.I. acid blue 9, disodium salt			0	1	0	
C.I. acid green 3			0	1	0	
C.I. basic green 4			3	1	0	
C.I. basic red 1			3	1	0	
C.I. disperse yellow 3			0	1	0	
C.I. food red 5			0	1	0	
C.I. food red 15			1	1	0	
C.I. solvent orange 7			0	1	0	
C.I. solvent yellow 3			0	1	0	
C.I. solvent yellow 14			2	1	0	
C.I. vat yellow 4			0	1	0	
Citric acid			0	1	0	
Citrus red No. 2			0	1	0	
Coal gas	1023	Poison gas	**2**	**4**	**0**	
Cobalt			1	3	0	
Cobalt acetate			1	0	0	
Cobalt bromide			2	0	0	
Cobalt carbonyl			2	0	0	
Cobalt chloride			3	0	0	
Cobalt fluoride			2	0	0	
Cobalt formate	9104		2	0	0	
Cobalt nitrate			2	0	1	OX
Cobalt sulfamate			2	0	0	
Cobalt sulfate			2	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

tert-BUTYL HYDROPEROXIDE

UN 2093 or 2094

Shipping Name: tert-Butyl hydroperoxide

Other Names: CADOXTHB
1,1-Dimethylethyl hydroperoxide
2-Hydroperoxy-2-methylpropene

WARNING!
- EXTREMELY FLAMMABLE!
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!
- CONTAINER MAY BLEVE OR EXPLODE WHEN EXPOSED TO FIRE!
- MAY EXPLODE IF SHOCKED OR EXPOSED TO FRICTION!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Description:
- Colorless to pale yellow liquid
- Somewhat sweet odor
- Moderately soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 17° F and boils at 95° F

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Remove all ignition sources
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

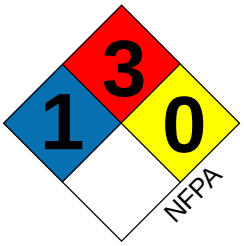
CAS 75-91-2

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Calcium	1401	Dangerous when wet	**3**	**1**	**2**	**W**
Calcium arsenite	1574	Poison	4	0	0	
Calcium chlorate	1452	Oxidizer	1	0	2	
Calcium chloride			1	0	0	
Calcium chromate	9096		2	0	0	
Calcium cyanide	1575	Poison	**3**	**0**	**1**	
Calcium fluoride			2	0	0	
Calcium hydride	1404	Dangerous when wet	3	4	2	W
Calcium hydroxide			1	0	0	
Calcium hypochlorite	1748	Corrosive	**3**	**0**	**1**	**OX**
Calcium nitrate	1454	Oxidizer	2	0	1	OX
Calcium oxide	1910	Corrosive	1	0	0	
Calcium peroxide	1457	Oxidizer	1	0	1	OX
Calcium phosphate			0	0	0	
Calcium phosphide	1360	Dangerous when wet	4	0	2	W
Calcium resinate			0	2	1	
Camphene	9011		2	2	0	
Camphor oil	1130	Flammable	**0**	**2**	**0**	
Cantharidin			4	1	0	
Caprolactam			1	1	0	
Capsicum			2	1	0	
Captan	9099		3	2	0	
Carbaryl (solid)	2757	Poison	2	0	0	
Carbolic oil	2821	Poison	3	2	0	
Carene			0	2	0	
Castor oil, edible			0	1	0	
Catechol			2	1	0	
Caustic potash solution	1814	Corrosive	3	0	1	
Cesium	1407	Dangerous when wet	2	4	2	W
Chloramben			0	0	0	
Chlorbisan			4	1	0	
Chlordane, flammable liquid	2762	Flammable	2	3	0	
Chlordecone			3	1	0	
Chlorfenvinfos			4	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Chlorine monoxide			3	4	3	OX
Chlorine pentafluoride	2548	Poison gas	3	0	2	OX,~~W~~
Chlormephos			3	1	0	
Chlormequat chloride			3	0	0	
Chloroacetic acid	1751	Corrosive	**3**	**1**	**0**	
Chloroacetone, stabilized	1695	Poison	2	2	0	
p-Chloroaniline	2018	Poison	2	1	0	
Chlorobenzilate			1	0	0	
2-Chlorobutane	1127	Flammable	**2**	**3**	**0**	
p-Chloro-m-cresol			1	1	0	
Chlorodibromomethane			2	0	0	
10-Chloro-5,10-dihydrophenarsazine (DM)			2	1	0	
Chlorodifluoromethane	1018	Nonflammable gas	0	0	0	
2-Chloroethane sulfonyl chloride			2	1	0	
2-Chloroethyl vinyl ether			**2**	**3**	**2**	
Chlorohydrins			2	3	1	
Chloromethyl ethyl ether	2354	Flammable	2	2	0	
Chloromethyl methyl ether	1239	Poison	2	3	1	
1-(Chloromethyl)-4-nitrobenzene			2	1	0	
2-Chloronaphthalene			**1**	**1**	**0**	
o-Chlorophenol	2021	Poison	**3**	**2**	**0**	
4-Chlorophenyl phenyl ether			1	1	0	
Chloropicrin: methyl chloride	1582	Poison gas	4	4	3	
Chloropivaloyl chloride	9263	Poison	3	1	0	
1-Chloropropane	1278	Flammable	**2**	**3**	**0**	
2-Chloropropane	2356	Flammable	**2**	**4**	**0**	
1-Chloro-1-propene			**2**	**4**	**2**	
2-Chloropropene	2456	Flammable	**2**	**4**	**2**	
Chloropropham			1	1	0	
1-Chloropropylene			**2**	**4**	**2**	
3-Chloropropyl octyl sulfoxide			3	1	0	
Chlorothalonil			3	1	0	
p-Chloro-o-toluidine			1	1	0	
3-Chlorotoluene	2238	Flammable	**2**	**2**	**0**	
Chlorotrifluoroethane	1983	Nonflammable gas	1	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



OCTENE

UN 3295

Shipping Name: Hydrocarbons, liquid, n.o.s.
Other Names: Caprylene
1-Octene
Octylene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 111-66-0

DINITRO-o-CRESOL

UN 1598

Shipping Name: Dinitro-o-cresol
Other Names: Capsine
2,4-Dinitro-o-cresol
Dinitrocresol
Nitrador
Nitrofan
Sinox

WARNING! • DILUTE MATERIAL WITH WATER! PURE MATERIAL (less than 10% water) MAY SPONTANEOUSLY EXPLODE IF HEATED OR IF SHOCKED!

Hazards:
- Irritating to skin, eyes, nose and lungs; prolonged contact will cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides

Description:
- Yellow solid
- No odor
- Insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Dilute material with foam or water
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 534-52-1

CARBACHOL CHLORIDE

Other Names: Carbachol
Carbacholin
Carbacholine dichloride
Carbamiotin
Choline chloride carbamate
Doryl
Lentin
Miostat

Hazards:
- Inhalation of the dust, absorption through the skin or swallowing the material can lead to severe illness
- Irritating to skin, eyes, nose and lungs
- Combustion products and decomposition products upon heating include toxic hydrogen chloride and nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:
- White to yellow powder or crystals
- Slight ammonia-like odor
- Soluble in water
- Flammable
- Usually shipped in a water solution

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Stop the release if it can be done safely from a distance
- Prevent material or contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: a cholinergic receptor agonist; if symptoms indicate, atropine is the initial antidote

CAS 51-83-2

UREA PEROXIDE

UN 1511

Shipping Name: Urea hydrogen peroxide
Other Names: Carbamide peroxide
Gly-oxide
Percarbamide

WARNING! ● STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Container may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White solid
- No odor
- Soluble in water releasing hydrogen peroxide
- Flammable

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 124-43-6

DIMETHYLCARBAMOYL CHLORIDE

UN 2262

Shipping Name: Dimethylcarbamoyl chloride
Other Names: Carbamoyl dimethyl chloride
Dimethylcarbamic chloride
DDC DMCC

WARNING! ● REACTS VIGOROUSLY WITH WATER PRODUCING HIGHLY FLAMMABLE DIMETHYLAMINE AND CORROSIVE HYDROCHLORIC ACID!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion and decomposition products upon heating include toxic nitrogen oxide and hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Irritating smell
- Sinks in water and rapidly decomposes to extremely flammable dimethylamine and corrosive hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -27° F

Operational Level Training Response:

RELEASE, NO FIRE:

- DO NOT use water directly on product - reacts with water to form dimethylamine and hydrochloric acid
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

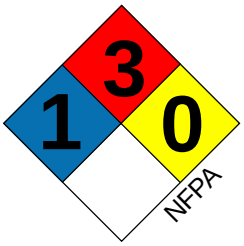
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid consider water decomposition products before using water. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 79-44-7



METHANOL

UN 1230

Shipping Name: Methyl alcohol
Other Names: Carbinol
Methyl hydroxide
Methylol
Wood alcohol

Hazards:

- Highly flammable, burns with invisible flame
- Containers may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin and eyes

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet alcohol odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 67-56-1

CARBOFURAN

UN 2757

Shipping Name: Carbamate, pesticides, solid, toxic
Other Names: Furadan
Furadan 3G
Furodan

WARNING!
- POISON! PROLONGED SKIN CONTACT, SWALLOWING THE MATERIAL OR BREATHING THE DUST CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- No odor
- Sinks in water and is insoluble in water
- Flammable
- May also be shipped and stored as a paste or a suspension in water
- A carbamate insecticide

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: is a carbamate insecticide: if symptoms indicate the initial antidote is atropine

CAS 1563-66-2

CARBON DISULFIDE

UN 1131

Shipping Name: Carbon disulfide
Other Names: Carbon bisulfide
Carbon disulphide
Carbon sulfide

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Inhalation of vapors, absorption through the skin or swallowing the liquid can cause severe illness
- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin will cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Combustion products include toxic sulfur oxides
- Corrosive to plastics and rubber

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to faint yellow liquid
- Rotten egg to sweet smell
- Sinks in water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 116° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

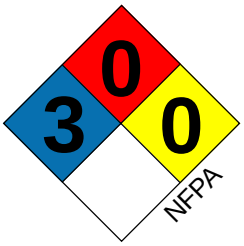
FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-15-0



CARBON TETRACHLORIDE

UN 1846

Shipping Name: Carbon tetrachloride

Other Names: Carbona, Carbon chloride, Carbon tet, Freon 10, Tetrachloromethane, Tetrasol

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Decomposition products upon heating include toxic hydrogen chloride and phosgene

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sweet, ether-like smell
- Sinks in water and is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

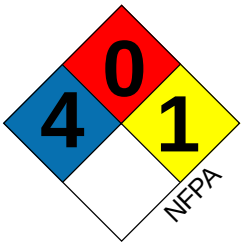
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors for a large release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 56-23-5



PHOSGENE

UN 1076

Shipping Name: Phosgene
Other Names: Carbon dichloride oxide
Carbon oxychloride
Carbonyl chloride
Phosgen
Chloroformyl chloride

WARNING! • POISON! BREATHING GAS WILL KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
• Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Containers not equipped with a safety valve may explode or rocket if exposed to heat or fire
- Reacts with water to form hydrochloric acid
- Corrosive to some metals, plastics and rubber
- Decomposition products upon heating include toxic chlorine gas and hydrogen chloride

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas; a colorless to light yellow fuming liquid below 46° F
- Musty odor like hay but may not be detectable at higher concentrations
- Shipped as liquefied compressed gas in cylinders
- Liquid sinks in water and reacts with water to form hydrochloric acid and carbon dioxide
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- Has been used as a war gas

Operations Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- If material is involved in a fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-44-5

CARBONYL FLUORIDE

UN 2417

Shipping Name: Carbonyl fluoride
Other Names: Carbon difluoride, Carbonic difluoride oxide, Carbon oxyfluoride, Fluorophosgene

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Extremely irritating to nose and lungs
- Contact with liquid may cause frostbite
- Gas is heavier than air and will collect and stay in low areas
- Container may explode or BLEVE when exposed to fire
- Decomposition products upon heating include toxic carbon monoxide and hydrogen fluoride
- Reacts with water releasing toxic hydrogen fluoride

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Colorless compressed gas or cryogenic liquid
- Slightly pungent odor, nearly odorless
- Decomposes in water to form toxic hydrofluoric acid
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff which may contain toxic hydrofluoric acid
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Do not perform mouth to mouth resuscitation; use a bag/mask apparatus
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 353-50-4

CARBON DIOXIDE

UN 1013
UN 2187
UN 1845

Shipping Name: UN 1013 Carbon dioxide
UN 2187 Carbon dioxide, refrigerated liquid
UN 1845 Carbon dioxide, solid *or* Dry ice

Other Names: Carbonic acid anhydride Carbonic anhydride
Carbonic acid gas Dry ice

Hazards:

- Replaces oxygen in enclosed areas leading to possible asphyxiation
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Container may BLEVE when exposed to fire
- Contact with solid may cause frostbite
- Gas is heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas, white solid (dry ice) or cryogenic liquid
- Odorless
- Solid sinks in water, liquid floats on the surface of water; is insoluble in water
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- Solid or liquid form will produce large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- DO NOT APPLY WATER to cryogenic liquid containers; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
- Seek medical attention
- Frostbite - warm injured area in very warm water

CAS: 124-38-9

CARBON MONOXIDE

UN 1016
UN 9202

Shipping Name: UN 1016 Carbon monoxide
UN 9202 Carbon monoxide, refrigerated liquid (cryogenic liquid)

Other Names: Carbon oxide, CO, Carbonic oxide, Flue gas

WARNING! ● POISON! BREATHING THE GAS CAN KILL YOU!
● EXTREMELY FLAMMABLE!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Under some conditions the gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE or explode when exposed to fire
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas or cryogenic liquid
- No odor
- Floats and boils on the surface of water and is slightly soluble in water
- Extremely flammable; flame has very little color
- Under some conditions the gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the release to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

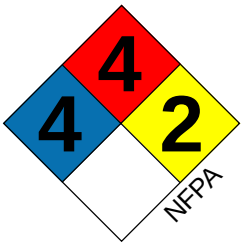
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location
- If material is not in cryogenic form, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 630-08-0



CYANOGEN

UN 1026

Shipping Name: Cyanogen, liquefied

Other Names: Carbon nitride, Dicyan, Dicyanogen, Ethane dinitrate, Oxalonitrile, Oxalyl cyanide, Prussite

WARNING!
- POISON! CONTACT WITH SKIN OR BREATHING THE GAS CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Containers may BLEVE or explode when exposed to fire
- Severely irritating to skin, eyes, nose and lungs
- Contact with liquid can cause frostbite
- Reacts with acids to produce toxic cyanides and nitrogen oxide
- Combustion products include toxic cyanides and nitrogen oxides

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquefied compressed gas
- Almond-like odor which may not be present at toxic levels
- Slightly soluble in water and boils on the surface of water forming toxic hydrogen cyanide
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other sign of deforming) withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 460-19-5

CARBONYL SULFIDE

UN 2204

Shipping Name: Carbonyl sulfide
Other Names: Carbon oxide sulfide
Carbon oxysulfide

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE or explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Contact with liquid may cause frostbite
- Combustion or decomposition products upon heating include toxic hydrogen sulfide and carbon monoxide

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas
- May be shipped as a compressed gas or cryogenic liquid
- Rotten egg-like odor
- Insoluble in water and decomposes in water to form toxic hydrogen sulfide
- Extremely flammable
- Burns with a bluish flame
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

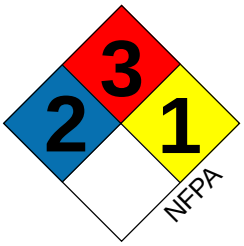
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location
- If material is not in cryogenic form, cool exposed containers with large quantities of water from unattended equipment or remove intactcontainers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 463-58-1



DIETHYL CARBONATE

UN 2366

Shipping Name: Diethyl carbonate

Other Names: Carbonic acid, diethyl ester; Carbonic ether; Diatol; Ethyl carbonate; Eufin

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pleasant, sweet odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 105-58-8

ETHYL CHLOROFORMATE

UN 1182

Shipping Name: Ethyl chloroformate
Other Names: Carbonochloride acid, ethyl ester
Chlorocarbonic acid, ethyl ester
Ethyl chlorocarbonate
Ethyl chloromethanoate

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Light yellow to water white liquid
- Distinct pungent odor like hydrochloric acid
- Sinks in water and reacts with water to form ethyl alcohol and chloroformic acid; is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 541-41-3

GASOLINE

UN 1203

Shipping Name: Gasoline

Other Names: Casing head gasoline, JP-4, Motor fuel, Motor spirit, Petrol

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid which may be dyed to a range of colors
- Characteristic odor
- Floats on water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Blended (oxygenated) gasolines may require higher foam application rates
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 8006-61-9

STRYCHNINE

UN 1692

Shipping Name: Strychnine
Other Names: Caswell No 805, Certox, Kwik-Kil, Mouse-Rid, Ro-Dex

WARNING! ● POISON! BREATHING THE DUST OR SWALLOWING THE SOLID CAN KILL YOU!
● Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Container may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:

- White to colorless solid
- No odor
- Sinks in water and is insoluble in water
- Flammable

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed

CAS: 57-24-9

SODIUM HYDROXIDE

UN 1823 (Dry solid)
UN 1824 (Solution)

Shipping Name: UN 1823 Sodium hydroxide, solid
UN 1824 Sodium hydroxide, solution

Other Names: Caustic soda; Caustic soda, solution; Lye; Soda lye; Sodium hydrate; White caustic

WARNING!
- CORROSIVE! SKIN AND EYE CONTACT WILL CAUSE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Reacts with water or moisture to produce large amounts of heat and may splatter
- Reacts with some metals to produce highly flammable hydrogen gas

Description:
- White solid or clear to milky solution in water
- No odor
- Soluble in water producing large amounts of heat
- Nonflammable

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover solid material to protect from wind, rain or spray
- Stop the release of liquid material if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 60 minutes and seek medical evaluation
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1310-73-2

CHLORAL

(ANHYDROUS, INHIBITED)

UN 2075

Shipping Name: Chloral, anhydrous, inhibited
Other Names: Grasex
Trichloroacetaldehyde
Trichloroethanal

Hazards:

- Severely irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Chemical reaction of compound may plug release vents causing a violent explosion
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, oily liquid
- Irritating odor
- Soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed

CAS: 75-87-6

PHOSPHORUS TRICHLORIDE

UN 1809

Shipping Name: Phosphorus trichloride
Other Names: Chloride of phosphorus
Phosphorus chloride
Trichlorophosphine

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS WITH WATER TO PRODUCE HEAT AND HYDROCHLORIC ACID!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Rapidly corrodes wet metals producing highly flammable hydrogen gas
- Decomposition products upon heating include toxic hydrogen chloride and phosphoric acid

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to slightly yellow oily liquid that fumes in moist air
- Pungent, musty disagreeable odor
- Sinks in water and reacts violently in water to form toxic hydrochloric acid and phosphoric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7719-12-2

CHLORINE

UN 1017

Shipping Name: Chlorine

Other Names: Liquid chlorine

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Gas is heavier than air and will collect and stay in low areas
- Container may explode when exposed to fire
- Reacts with water to form toxic hypochlorous acid
- Contact with liquid may cause frostbite
- Corrosive to some rubbers and plastics

Description:
- Greenish-yellow gas
- Shipped as a pressurized liquefied gas
- Pungent bleach-like odor
- Reacts with water to form toxic hypochlorous acid and is slightly soluble in water
- Nonflammable but may cause combustibles to ignite
- Gas is heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire, evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the release to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7782-50-5

CYANOGEN CHLORIDE

(INHIBITED)

UN 1589

Shipping Name: Cyanogen chloride, inhibited

Other Names: Chlorine cyanide Chlorocyanogen
Chlorocyan CK

WARNING!
- POISON! BREATHING THE GAS, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Gas is heavier than air and will collect and stay in low areas
- Containers may BLEVE or explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Contact with liquid may cause frostbite
- Decomposition products upon heating include toxic chlorine gas, cyanide and nitrogen oxides

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless gas
- Sharp pungent odor
- Shipped and stored as a compressed gas
- Slightly soluble in water and react slowly with water to form toxic hydrogen cyanide
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid below 56° F
- Has been used as a war gas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- The contaminated vicitm poses a risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basci Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 506-77-4

CHLORINE TRIFLUORIDE

UN 1749

Shipping Name: Chlorine trifluoride
Other Names: Chlorine fluoride
Chlorotrifluoride
Trifluorochlorine

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! GAS EXPLODES UPON CONTACT WITH COMBUSTIBLE MATERIAL OR WATER!

Hazards:
- Container may explode or BLEVE when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Reacts with water to form toxic chlorine gas and hydrofluoric acid
- Corrosive to metals and rubber; reacts vigorously with sand, glass and concrete

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless gas above 53° F
- Greenish-yellow fuming liquid below 53° F
- Pungent, sweet odor
- Reacts violently with water producing toxic chlorine gas and hydrofluoric acid
- Nonflammable but may cause combustibles to ignite
- Gas is heavier than air and will collect and stay in low areas

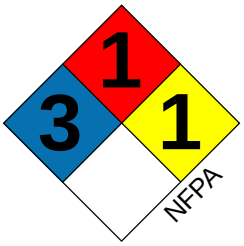
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Do not allow water to come in contact with the material; material does not burn, fight surrounding fire with an agent appropriate (not water or foam) for the material burning
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7790-91-2



SULFUR DICHLORIDE

UN 1828

Shipping Name: Sulfer chlorides
Other Names: Chlorine sulfide
Dichlorosulfane

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Strong oxidizer that will increase the intensity of a fire and may cause fire upon contact with combustibles
- Reacts violently with many metals and acids and hydrogen gas
- Combustion and decomposition products upon heating include toxic sulfur oxides and chlorine gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Reddish-brown, fuming liquid
- Pungent, irritating odor
- Sinks in water and reacts with water to form hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material; if possible, do not allow water to come in contact with the material. If material is on fire, use dry chemical to extinguish; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other sign of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10545-99-0

METHANESULFONYL CHLORIDE

UN 3246

Shipping Name: Methanesulfonyl chloride
Other Names: Chloro methyl sulfane
Mesyl chloride
Methanesulfonic acid chloride
Methane sulfuryl chloride

Hazards:

- Irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion and decomposition products upon heating include toxic sulfur oxides and hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Pale yellow liquid
- Pungent sharp odor
- Reacts slowly with water to form toxic hydrochloric acid and is slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -26° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

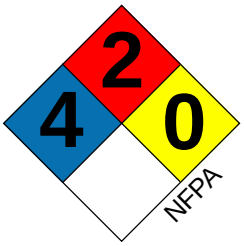
FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 124-63-0



ETHYLENE CHLOROHYDRIN

UN 1135

Shipping Name: Ethylene chlorohydrin
Other Names: 2-Chloroethanol
2-Chloro-1-ethanol
Chloroethanol

WARNING!
- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Irritating to skin, eyes, nose and lungs at low concentrations
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include the toxic phosgene gas and hydrogen chloride gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sweet, ether-like odor
- Soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed

CAS: 107-07-3

CHLOROTOLUENE

UN 2238

Shipping Name: Chlorotoluene
Other Names: 1-Chloro-4-methylbenzene
4-Chloro-1-methylbenzene
4-Chlorotoluene
p-Chlorotoluene
p-Tolyl chloride

Hazards:

- Very irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Insoluble in water
- Aromatic odor
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 46° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

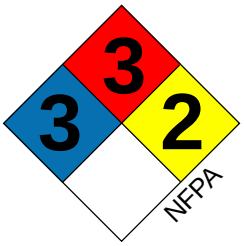
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 106-43-4



EPICHLORHYDRIN

UN 2023

Shipping Name: Epichlorhydrin

Other Names: 1-Chloro-2,3-epoxypropane ECH
Chloromethyloxirane EPI
Chloropropylene oxide

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- May react with itself at high temperatures blocking relief valves leading to tank explosion
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode if ignited
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Irritating, chloroform-like odor
- Sinks in water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam only to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 106-89-8

3-CHLOROPROPIONITRILE

UN 3275

Shipping Name: Nitriles, toxic, flammable, n.o.s.
Other Names: 1-Chloro-2-cyanoethane
3-Chloropropanenitrile

WARNING! ● POISON! BREATHING THE VAPORS, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
● Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may BLEVE when exposed to fire
- Irritating to eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides and hydrogen chloride

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Irritating odor
- Sinks in water and is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminatd victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity; if symptoms indicate, inital treatment includes the cyanide antidote kit

CAS: 542-76-7

CHLORONITROBENZENE

UN 1578

Shipping Name: Chloronitrobenzene, ortho, liquid
Chloronitrobenzene, meta, para, solid

Other Names: 1-Chloro-2-nitrobenzene
m-Chloronitrobenzene
o-Chloronitrobenzene
p-Chloronitrobenzene
Nitrochlorobenzene

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic nitrogen oxides and hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:

- Yellow solid
- Aromatic odor
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Melts at 90° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 88-73-3 (ortho, o-), 121-73-3 (meta, m-), 100-00-5 (para, p-)

CHLOROACETALDEHYDE

UN 2232

Shipping Name: 2-Chloroethanal

Other Names: 2-Chloroacetaldehyde
Chloroacetaldehyde monomer
Chloroaldehyde
Chloroethanal

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear colorless liquid
- Pungent odor
- Initally sinks in water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 3° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resitant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-20-0

CHLOROACETYL CHLORIDE

UN 1752

Shipping Name: Chloroacetyl chloride
Other Names: Chloroacetic acid chloride
Chloroacetic chloride

WARNING! • DO NOT USE WATER! REACTS WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE AND CHLOROACETIC ACID!

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns and blindness
- Fire fighting gear (including SCBA) does not provide enough protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic hydrogen chloride and phosgene
- Corrosive to metals

Awareness and Operational Training Level Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Pungent odor
- Reacts with water to form toxic hydrogen chloride and is soluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -8° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- If possible do not allow water to come in contact with the material. Material does not burn; fight surrounding fire with an appropriate agent: avoid using water or foam
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely.
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 79-04-9

ETHYL CHLOROACETATE

UN 1181

Shipping Name: Ethyl chloroacetate
Other Names: Chloroacetic acid, ethyl ester
Ethyl monochloroacetate

Hazards:

- Severely irritating to skin, eyes, nose and lungs; produces tearing
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless or white liquid
- Fruity, pungent odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -15° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other sign of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 105-39-5

METHYL CHLOROACETATE

UN 2295

Shipping Name: Methyl chloroacetate
Other Names: Chloroacetic acid, methyl ester
Methyl monochloroacetate

Hazards:

- Very irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, pungent odor
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -28° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 96-34-4

CHLOROACETONITRILE

UN 2668

Shipping Name: Chloroacetonitrile
Other Names: Chloroethanenitrile
Chloromethyl cyanide

WARNING!
- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE LIQUID CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Low concentrations are very irritating to skin, eyes, nose and lungs
- Vapors may travel long distances to ignition sources and flashback
- Combustion or decomposition products upon heating include toxic nitrogen oxides and hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent odor
- Sinks in water and is moderately soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- APPROACH FIRE WITH EXTREME CAUTION; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using alcohol resitant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Note to physician:can produce cyanide toxicity; if symptoms indicate, inital treatment includes the cyanide antidote kit

CAS: 107-14-2

METHYL 2-CHLOROACRYLATE

Other Names: 2-Chloroacrylic acid, methyl ester
Methyl 2-chloropropenoate

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- At elevated temperatures may react with itself without warning blocking relief valves leading to container explosion
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Acrid odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

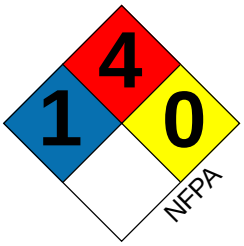
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 80-63-7



ETHYL CHLORIDE

UN 1037

Shipping Name: Ethyl chloride
Other Names: Chloroethane
Hydrochloric ether
Monochlorethane
Muriatic ether

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic hydrogen chloride

Description:

- A colorless gas shipped and stored as a colorless liquid stored under pressure
- Pungent to pleasant ether-like odor
- Floats on the surface of water and is slightly soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 54° F

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-00-3

1,1,1-TRICHLOROETHANE

UN 2831

Shipping Name: 1,1,1-Trichloroethane

Other Names:

Chloroethane	Solvent 111
Chlorylen	Tri
Dowclene LS	Triethane
Methylchloroform	Methyltrichloromethane

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, chloroform-like odor
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Freezes at -22° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

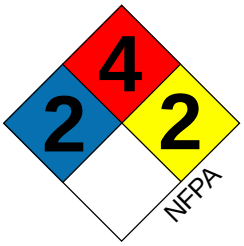
FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 71-55-6



VINYL CHLORIDE

(INHIBITED OR STABILIZED)

UN 1086

Shipping Name: Vinyl chloride, inhibited or stabilized

Other Names:		
	Chloroethene	VC
	Chloroethylene	VCM
	Monochloroethylene	Vinyl chloride monomer

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO VIOLENT CONTAINER EXPLOSION!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes and lungs
- Combustion products include toxic hydrogen chloride
- Contact with liquid may cause frostbite
- Known to cause cancer in humans following long term exposure: contact should be avoided

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For containers exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas
- Shipped as liquefied compressed gas
- Sweet, pleasant odor
- Liquid floats and boils on the surface of water; gas is insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- Combustion produces a visible and toxic vapor cloud
- Becomes a liquid below 7° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting suddenly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-01-4

CHOLROETHYL CHLOROFORMATE

UN 2742

Shipping Name: Chloroformates, toxic, corrosive, n.o.s.

Other Names: 2-Chloroethyl chlorocarbonate

Hazards:

- Extremely irritating to nose and lungs; skin and eye contact can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent odor
- Sinks in water; reacts slowly with water to form toxic hydrochloric acid and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 627-11-2

CHLOROFORM

UN 1888

Shipping Name: Chloroform

Other Names: Formyl trichloride, TCM, Freon 20, Trichloroform, Methane trichloride, Trichloromethane, R 20 (refrigerant)

Hazards:

- Irritating to skin, eyes, nose and lungs
- Containers may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Decomposes upon exposure to high temperatures to highly toxic phosgene and hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear colorless liquid
- Sweet odor
- Sinks in water and is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of a thin layer of water or foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 67-66-3

ISOPROPYL CHLOROFORMATE

UN 2407

Shipping Name: Isopropylchloroformate

Other Names: Chloroformic acid, isopropyl ester
Isopropyl chlorocarbonate
2-Propyl chloroformate

WARNING! ● EXPLOSIVE! CONTAINERS HAVE EXPLODED EVEN WHEN REFRIGERATED!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; may cause burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Decomposes upon heating to form toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate a wide area around the release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent irritating odor
- Sinks in water and is insoluble in water
- Reacts slowly with water to form toxic hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-23-6

2-CHLOROPHENYLTHIOUREA

Other Names: N-(2-chlorophenylthiourea)
Thiourea (2-chlorophenyl)

WARNING!
- POISON! BREATHING OR SWALLOWING THE POWDER OR ABSORPTION THROUGH THE SKIN CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Combustion and decomposition products upon heating include toxic hydrogen chloride, and nitrogen oxides and sulfur oxides

Description:
- Colorless solid
- No odor
- Soluble in water
- Flammable

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 5344-82-1

CHLOROPICRIN

UN 1580

Shipping Name: Chloropicrin

Other Names: Nitrochloroform, Picfume, Tri-clor, Pic-chlor, PS, Picride, Trichloronitromethane

WARNING!

- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Decomposes explosively when heated above 234° F
- Vapors are heavier than air and will collect and stay in low areas
- Decomposition products upon heating include toxic phosgene, chlorine gas and nitrogen oxides
- Corrosive to rubber and some plastics

Description:

- Pale yellow oily liquid
- Intensely irritating odor
- Sinks in water and is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Used as a choking agent

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of fire or release and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn, fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- The contaminatd victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 76-06-2

SULFUR MONOCHLORIDE

UN 1828

Shipping Name: Sulfur chlorides
Other Names: Chlorosulfane
Disulfur dichloride
Sulfur chloride
Sulfur subchloride

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE; MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE when exposed to fire
- Reacts violently with many metals and acids
- Combustion and decomposition products upon heating include toxic sulfur oxides and chlorine gas
- Corrosive to metals and some plastics when wet

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Light amber to yellowish red oily fuming liquid
- Nauseating odor
- Sinks in water and reacts with water to form toxic hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material; if material is on fire, use dry chemical to extinguish; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other sign of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10025-67-9

CHLOROSULFONIC ACID

UN 1754

Shipping Name: Chlorosulfonic acid
Other Names: Chlorosulfuric acid
Sulfuric chlorohydrin

WARNING!

- POISON! BREATHING THE VAPORS OR SWALLOWING THE LIQUID CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROCHLORIC AND SULFURIC ACIDS!
- EXTREMELY STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Reacts with metals in the presence of moisture to form highly flammable hydrogen gas
- Decomposition products upon heating include toxic sulfur oxides and hydrogen chloride
- Corrosive to most metals

Description:

- Colorless to slightly yellow liquid
- Pungent odor
- Reacts violently with water to form toxic hydrochloric acid and sulfuric acid and sinks in water
- Vapors are heavier than air and will collect and stay in low areas
- Nonflammable but may cause combustibles to ignite
- Produces large amounts of vapor when exposed to water

Awareness and Operational Training Level Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- DO NOT USE WATER DIRECTLY ON PRODUCT - reacts violently with water
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Material does not burn; fight surrounding fire with dry chemical - if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding) withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7790-94-5

TRIFLUORO CHLOROETHYLENE

(INHIBITED)

UN 1082

Shipping Name: Trifluorochloroethylene

Other Names: Chlorotrifluoroethylene R1113
CTFE Trifluorovinyl chloride
Diaflan Trithene

WARNING! ● EXTREMELY FLAMMABLE!
● EXPLOSIVE! CONTAINER MAY BLEVE OR EXPLODE WHEN EXPOSED TO FIRE!

Hazards:
- Chemical reaction of compound may plug pressure release vents causing a violent explosion
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flash back
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Contact with liquid may cause frostbite
- Combustion products include toxic hydrochloric acid and hydrofluoric acid vapors

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless gas
- Shipped and stored as a liquefied compressed gas
- Odorless or faint ether-like odor
- Sinks in water and boils in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- A liquid below -18° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Contact with liquid may cause frostbite
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 79-38-9

TRIMETHYLCHLOROSILANE

UN 1298

Shipping Name: Trimethylchlorosilane
Other Names: Chlorotrimethylsilane

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE!

Hazards:

- Containers may BLEVE when exposed to fire
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Corrosive to metals releasing highly flammable hydrogen gas
- Decomposition products upon heating include toxic hydrogen chloride gas

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue victim!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless fuming liquid
- Pungent odor
- Floats on water and reacts violently with water to form toxic hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with low or medium expansion (AFFF) alcohol resistant foam
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue victim!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-77-4

LEWISITE

UN 1556

Other Names: Chlorovinyldichloroarsine
Chlorovinylarsine dichloride
Dichloro (2-chlorovinyl) arsine
L
M-1

WARNING! • POISON! BREATHING THE VAPOR, OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
• Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence toxic amounts of vapor
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride and arsenic compunds

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area of release or fire, deny entry and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid if pure; turns violet to black or green with age
- Faint geranium-like odor
- Sinks in water and insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 9° F
- Has been used as a blister-type war gas

Operational Level Training Response:

RELEASE, NO FIRE:
- BACK OFF! - Isolate a wide area around the release and call for expert help
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location
- Use unattended equipment whenever possible

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 541-25-3

CHLORPYRIFOS

UN 2783

Shipping Name: Organophosphorous pesticides, solid, toxic
Other Names: Dursban
Lorsban

Hazards:
- Ingestion, skin absorption or inhalation of the dust can cause illness
- Container may explode when exposed to fire
- Combustion products include toxic hydrogen chloride and sulfur oxides

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- Often shipped as a liquid in water or petroleum products
- Mild sulfur-like odor
- Insoluble in water
- Very flammable
- Melts at 108° F
- An organophosphate insecticide

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Use water or foam to extinguish
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: is an organophosphate insecticide; if symptoms indicate, the initial antidote is atropine

CAS: 2921-88-2

STYRENE
(MONOMER, INHIBITED)

UN 2055

Shipping Name: Styrene monomer, inhibited

Other Names: Cinnamenol, Ethenylbenzene, Phenylethylene, Styrene monomer, Styrol, Styrolene, Vinyl benzene

WARNING! ● MAY REACT WITH ITSELF BLOCKING RELIEF VALVES LEADING TO TANK EXPLOSION!

Hazards:
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Very irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to yellow liquid
- Sharp, disagreeable odor that is sweet at lower concentrations
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -23° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, vent sound suddenly increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 100-42-5

KEROSENE

UN 1223

Shipping Name: Kerosene
Other Names: Coal oil
Fuel oil #1
Jet A
JP-1
JP-4
Kerosine
Range oil

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Irritating to skin and eyes

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to light brown-amber liquid
- Petroleum-like odor
- Floats on water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 8008-20-6

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Cocculus	1584	Poison	3	1	0	
Coconut oil: edible			**0**	**1**	**0**	
Colchicine			3	1	0	
Collodion	2059	Flammable	**1**	**4**	**0**	
Copper			0	0	0	
Copper acetate	9106		1	0	0	
Copper acetoarsenite	1585	Poison	3	0	0	
Copper arsenite	1586	Poison	4	0	0	
Copper bromide			2	0	0	
Copper chloride	2802	Corrosive	2	0	0	
Copper cyanide	1587	Poison	4	0	0	
Copper fluoroborate			3	0	0	
Copper formate			2	0	0	
Copper glycinate			1	1	0	
Copper iodide			2	0	0	
Copper lactate			1	1	0	
Copper naphthenate			0	2	0	
Copper nitrate			1	0	1	OX
Copper oxalate			0	0	0	
Copper subacetate			1	0	0	
Copper sulfate			2	0	0	
Copper sulfate, ammoniated	9110		1	0	0	
Copper tartrate	9111		1	0	0	
Coumaphos	2783	Poison	3	1	0	
Coumatetralyl			4	1	0	
CR (Dibenzo (b,f)-1,4-oxazepine)			2	1	0	
Creosote, coal tar	1993	Combustible liquid	2	2	0	
p-Cresidine			1	2	0	
Cresols	2076	Poison	**3**	**2**	**0**	
Cresyl glycidyl ether			1	2	0	
Cresylate spent caustic solution			3	0	0	
Crimidine	2588	Poison	4	1	0	
Croton oil			4	1	0	
Crude oil	1267	Flammable	0	1	0	
Cupferron			2	1	0	
Cupriethylene diamine solution	1761	Corrosive	1	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Glutaraldehyde solution			2	0	0	
Glycerine			**1**	**1**	**0**	
Glycidaldehyde	2622	Flammable	2	3	0	
Glycidyl methacrylate			2	2	1	
Glyoxal			1	0	2	~~W~~
Hendecane	2330	Flammable	**0**	**2**	**0**	
Heptachlor			3	0	0	
Heptachlor epoxide			3	1	0	
Heptachlorodibenzofurans			4	1	0	
Heptachlorodibenzo-p-dioxins			4	1	0	
Heptanoic acid			1	1	0	
Heptanol			**0**	**2**	**0**	
Heptyl acetate			0	2	0	
Hexachloroacetone	2661	Keep away from food	1	0	0	
Hexachlorobenzene	2729	Poison	1	1	0	
Hexachlorobutadiene	2279	Poison	**2**	**1**	**1**	
Hexachlorocyclohexanes			2	1	0	
Hexachlorocyclopentadiene	2646	Poison	2	1	0	
Hexachlorodibenzofurans			4	1	0	
Hexachlorodibenzo-p-dioxins			4	1	0	
Hexachloroethane	9037		0	0	0	
Hexachloronaphthalene			1	1	0	
Hexachlorophene	2875	Poison	3	1	0	
Hexadecyl sulfate, sodium salt			1	0	0	
Hexadecyl trimethyl ammonium chloride			1	2	0	
Hexaethyl tetraphosphate and compressed gas	1612	Poison gas	3	1	1	
Hexafluoroacetone	2420	Poison gas	3	0	0	
Hexafluoroethane	2193	Nonflammable gas	**1**	**0**	**0**	
n-Hexaldehyde	1207	Flammable	**2**	**3**	**1**	
Hexamethyl phosphoramide			1	1	0	
Hexamethylenediamine	2280	Corrosive	1	2	0	
Hexamethylene diisocyanate	2281	Poison	3	1	1	
Hexamethyleneimine	2493	Flammable	2	3	0	
Hexamethylene tetramine	1328	Flammable	2	1	0	
1-Hexanol	2282	Flammable	**2**	**3**	**1**	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

ISOPROPYLBENZENE

UN 1918

Shipping Name: Isopropylbenzene
Other Names: Cumene
Curmol
2-Phenylpropane

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs; prolonged contact will cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sharp, aromatic odor
- Insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 98-82-8

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Cyanazine			2	1	0	
Cycasin			2	2	0	
Cyclobutane	2601	Flammable gas	**1**	**4**	**0**	
Cycloheptatriene	2603	Flammable	2	3	0	
Cycloheptene	2242	Flammable	1	3	0	
Cyclohexanol			**1**	**2**	**0**	
Cyclohexanone peroxide	2119		1	2	2	OX
Cyclohexene	2256	Flammable	**1**	**3**	**0**	
Cyclohexenyl trichlorosilane	1762	Corrosive	2	2	1	W
Cyclohexyl acetate	2243	Flammable	1	2	0	
Cyclohexyl isocyanate	2488	Poison	2	2	0	
Cyclopentanol	2244	Flammable	**0**	**2**	**0**	
Cyclopentanone	2245	Flammable	**2**	**3**	**0**	
p-Cymene	2046	Flammable	**2**	**2**	**0**	
Dalapon	1760	Corrosive	1	1	1	
DDD	2761	Poison	2	1	0	
4,4'-DDT	2761	Poison	2	2	0	
Decabromodiphenyl oxide			2	0	0	
Decahydronaphthalene	1147	Flammable	**2**	**2**	**0**	
Decaldehyde			0	2	0	
Decanoic acid			0	1	0	
1-Decene			0	2	0	
n-Decyl acrylate			**2**	**1**	**0**	
n-Decyl alcohol			**0**	**2**	**0**	
n-Decyl benzene			**2**	**1**	**0**	
Demeton			3	2	0	
Demeton-s-methyl			2	2	0	
Deuterium	1957	Flammable gas	**0**	**4**	**0**	
Dextrose solution			0	0	0	
Diacetone alcohol	1148	Flammable	**1**	**2**	**0**	
Diacetone alcohol peroxide	2163	Forbidden	2	4	4	OX
Diacetyl	2346	Flammable	**1**	**3**	**0**	
N,N'-diacetyl benzidine			2	1	0	
Dialifos	3018	Poison	4	1	0	
Diallate			2	0	0	
Diallylamine	2359	Flammable	3	3	1	
Diallyl ether	2360	Flammable	**3**	**3**	**2**	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

CYANOACETIC ACID

UN 3275

Shipping Name: Nitriles, toxic, flammable, n.o.s.
Other Names: Malonic mononitrile

WARNING!
- POISON! BREATHING THE VAPORS OR SWALLOWING THE LIQUID CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic nitrogen oxides and hydrogen cyanide and flammable acetonitrile

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White crystalline solid
- No odor found
- Soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause cyanide toxicity; if symptoms indicate, the initial treatment is the cyanide antidote kit

CAS: 372-09-8

MALONONITRILE

UN 2647

Shipping Name: Malononitrile

Other Names: Cyanoacetonitrile, Dicyanomethane, Malonic acid dinitrile, Malonic dinitrile, Methylene cyanide

WARNING!

- POISON! BREATHING THE DUST OR THE FUMES FROM COMBUSTION OR DECOMPOSITION UPON HEATING CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Combustion and decomposition products upon heating include toxic nitrogen oxides and cyanide
- May react with itself violently at elevated temperatures or upon contact with acids
- Container may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White solid
- Sinks in water and is moderately soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Melts at 93° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician:can cause cyanide toxicity; if symptoms indicate, the initial treatment includes the cyanide antidote kit

CAS: 109-77-3

PROPIONITRILE

UN 2404

Shipping Name: Propionitrile
Other Names: Cyanoethane
Ethyl cyanide
Propionic nitrile
Propylnitrile

WARNING! • POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
• Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel.

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Highly flammable
- Container may BLEVE or explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion and decomposition products upon heating include toxic cyanide and nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to brown liquid
- Sweet odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam only to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

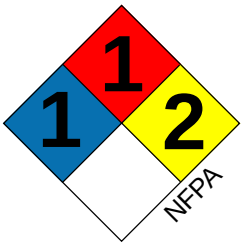
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support (CPR) as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 107-12-0



ETHYLENE CYANOHYDRIN

Other Names: 2-Cyanoethyl alcohol
2-Cyanohydrin
Glycol cyanohydrin
Hydracrylonitrile
3-Hydroxypropionitrile

Hazards:

- Combustion and decomposition products upon heating include toxic hydrogen cyanide and nitrogen oxides
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- May react with itself when heated blocking relief valves leading to container explosion

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- No odor
- Soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution because heated material releases highly toxic hydrogen cyanide. Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: fumes from heated material contain hydrogen cyanide; can produce cyanide toxicity - if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 109-78-4

CYANOGEN IODIDE

Other Names: Cyanogen monoiodide
Iodine cyanide

WARNING!
- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Decomposition products upon heating include toxic cyanide gas, iodide gas and nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- Pungent odor
- Soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 506-78-5

FORMALDEHYDE CYANOHYDRIN

Other Names: Cyanomethanol, Glycolonitrile, Glyconitrile, Hydroxyacetonitrile, Methylene cyanohydrin

WARNING!
- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES LEADING TO TANK EXPLOSION!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen cyanide and nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

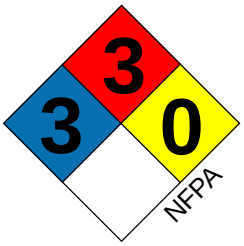
Description:
- Colorless oily liquid
- Shipped as 70% water solution stabilized with phosphoric acid
- No odor
- Soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated vicitm poses a risk to the responder
- Decontaminate the victim from a distance, provide Basic Life Support/CPR as needed and further decontaminate as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible; Toxic effects may be delayed
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 107-16-4



ISOBUTYRONITRILE

UN 2284

Shipping Name: Isobutyronitrile
Other Names: 2-Cyanopropane
Isopropyl cyanide
Isopropyl nitrile

WARNING!
- POISON! BREATHING THE VAPOR, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Highly flammable
- Containers may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors may explode in confined areas (e.g., tanks, sewers, buildings)
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless clear liquid
- Almond-like odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 78-82-0

METHYL ACRYLONITRILE

(INHIBITED)

UN 3079

Shipping Name: Methyl acrylonitrile, inhibited

Other Names: 2-Cyanpropene; 2-Methylpropenenitrile; Isopropene cyanide; Methacrylonitrile; USAFST-40

WARNING!

- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF WITHOUT WARNING WITH EXPLOSIVE VIOLENCE!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides and cyanide

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Bitter almond-like odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly increases or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Deccontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 126-98-7

CYANURIC CHLORIDE

UN 2670

Shipping Name: Cyanuric chloride
Other Names: 2,4,6-Trichloro-s-triazine

WARNING! • DO NOT USE WATER! MAY REACT VIOLENTLY WITH WATER TO FORM TOXIC HYDROCHLORIC ACID!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may explode when exposed to fire
- Combustion products include toxic hydrogen chloride and nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless solid
- Pungent odor
- Insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- DO NOT USE WATER DIRECTLY ON THE MATERIAL
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

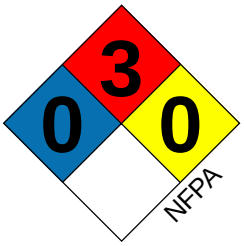
FIRE:

- Do not allow water to come in contact with the material; fight fire with dry chemical if possible - if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-77-0



CYCLOHEPTANE

UN 2241

Shipping Name: Cycloheptane
Other Names: Heptamethylene
Suberane

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, oily liquid
- Hydrocarbon-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 10° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

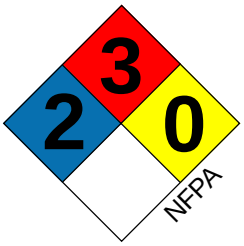
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 291-64-5



METHYLCYCLOHEXANE

UN 2296

Shipping Name: Methylcyclohexane
Other Names: Cyclohexylmethane
Hexahydrotoluene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Slight benzene-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-87-2

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
p-Toluene sulfonic acid	2585	Corrosive	3	1	0	
Toxaphene	2761	Poison	3	0	0	
2,4,5-TP (or Silvex)	2765	Poison	2	1	0	
Triamiphos			3	1	0	
Triaziquone			2	1	0	
Triazofos			2	1	0	
Tributylamine	2542	Corrosive	**3**	**2**	**0**	
Tributyl phosphate			2	1	0	
Tricarbonyl methyl cyclopentadienyl manganese			3	1	1	
Trichlorfon	2783	Poison	2	1	0	
Trichloroacetic acid	1839	Corrosive	2	0	0	
Trichlorobenzene	2321	Keep away from food	**2**	**1**	**0**	
1,2,4-Trichlorobenzene	2321	Poison	2	1	0	
Trichlorobutene	2322	Poison	2	1	0	
Trichloro(chloromethyl)silane			3	2	1	₩
Trichlorofluoromethane			1	0	0	
Trichloronate			3	1	0	
2,4,6-Trichlorophenol	2020	Poison	2	0	0	
2,4,5-Trichlorophenoxyacetic acid	2765	Poison	2	1	0	
2,4,5-Trichlorophenoxyacetic acid, sodium salt			2	1	0	
2-(2,4,5-Trichlorophenoxy)propanoic acid	2765	Poison	2	1	0	
2-(2,4,5-Trichlorophenoxy)propanoic acid, isooctyl ester			2	1	0	
Trichlorophenylsilane			3	2	0	
1,2,3-Trichloropropane			1	2	0	
Trichloro-s-triazinetrione	2468	Oxidizer	2	0	0	OX
Trichlorotrifluoroethane			0	0	0	
1,1,2-Trichloro-1,2,2-trifluoroethane			0	0	0	
Tri-p-cresyl phosphate	2574	Poison	**2**	**1**	**0**	
Tridecane			0	2	0	
Tridecanol			0	1	0	
1-Tridecene			0	2	0	
Tridecyl benzene			1	1	0	
Triethanol amine			**2**	**1**	**1**	
Triethoxysilane			2	3	0	
Triethyl aluminum			**3**	**4**	**3**	**₩**

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

CYCLOPENTANE

UN 1146

Shipping Name: Cyclopentane
Other Names: Pentamethylene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

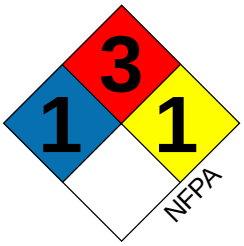
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 287-92-3



CYCLOPENTENE

UN 2246

Shipping Name: Cyclopentene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs; prolonged contact with skin will cause burns

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils at 111° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

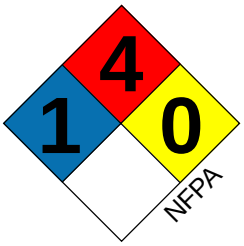
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 142-29-0



CYCLOPROPANE

UN 1027

Shipping Name: Cyclopropane, liquefied
Other Names: Trimethylene

WARNING!
- EXTREMELY FLAMMABLE!
- FOR CONTAINERS EXPOSED TO FIRE EVACUATE THE AREA IN ALL DIRECTIONS BECAUSE OF THE RISK OF BLEVE OR EXPLOSION!

Hazards:

- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas
- May be shipped and stored as a cryogenic liquid
- Mild sweet odor
- Floats and boils on the surface of water producing a visible flammable vapor cloud; is moderately soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location
- If material is not leaking, cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-19-4

2,4-D

UN 2765

Shipping Name: Phenoxy pesticides, solid, toxic
Other Names: 2,4-Dichlorophenoxyacetic acid
Dichlorophenoxyacetic acid
Weedone

Hazards:

- Swallowing or inhaling the dust can cause illness
- Container may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White to yellow solid
- No odor
- Sinks in water and is insoluble in water
- Flammable
- An herbicide

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

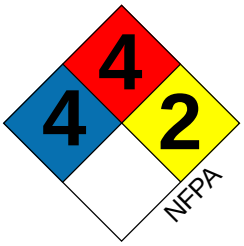
FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 94-75-7



VINYLIDENE CHLORIDE

(INHIBITED)

UN 1303

Shipping Name: Vinylidene chloride, inhibited

Other Names:	1,1,1-DCE	1,1-Dichloroethylene
	DCE	NCI-C54262
	1,1-Dichloroethane	VDC

WARNING! ● EXTREMELY FLAMMABLE! CONTAINER MAY EXPLODE WHEN EXPOSED TO FIRE!
● MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELEASE VALVES AND CAUSING A VIOLENT EXPLOSION!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- On storage, forms white solid deposits which may explode with shock or heat
- Combustion products include toxic phosgene and hydrogen chloride which may be more toxic than the material itself
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless clear liquid
- Sweet chloroform-like odor
- Sinks in water and is slightly soluble in water
- Extremely flammable
- Forms white solid deposits on storage which may explode with shock or heat
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils at 89° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-35-4

1,1-DICHLOROETHANE

UN 2362

Shipping Name: 1,1-Dichloroethane
Other Names: 1,1-DCE
Ethylidine chloride
Ethylidine dichloride

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion or decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Chloroform-like odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-34-3

DIETHYLAMINOETHANOL

UN 2686

Shipping Name: Diethylaminoethanol
Other Names: DEAE
2-Diethylaminoethanol
Diethylethanolamine
2-Hydroxytriethylamine

Hazards:

- Severely irritating to skin, eyes, nose and lungs; can cause burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Ammonia-like odor
- Floats on the surface of water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

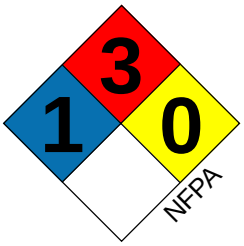
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 100-37-8



DIETHYL KETONE

UN 1156

Shipping Name: Diethyl ketone

Other Names: DEK, Dimethylacetone, Ethyl ketone, Methacetone, 3-Pentanone

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless clear liquid
- Acetone-like odor
- Floats on the surface of water and is sightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 96-22-0

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
4,4'-Diaminodiphenyl ether			1	1	0	
Diaminotoluene (mixed isomers)			2	1	0	
Diammonium sulfate			0	0	0	
Di-n-amylamine	2841	Poison	**3**	**2**	**0**	
Di-n-amyl phthalate			**0**	**1**	**0**	
Diazinon	2783	Poison	3	1	0	
Diazomethane			4	3	3	
Dibenzo (A,E) pyrene			1	1	0	
Dibenzo (A,H) anthracene			1	1	0	
Dibenzo (A,H) pyrene			1	1	0	
Dibenzo (A,I) pyrene			1	1	0	
Dibenzo (A,J) acridine			1	1	0	
Dibenzo (A,L) pyrene			1	1	0	
Dibenzo (b,f)-1,4-oxazepine (CR)			2	1	0	
7H-Dibenzo (C,G) carbazole			2	1	0	
Dibenzofuran			1	1	0	
Dibenzoyl peroxide	2087	Organic peroxide	0	3	3	OX
1,2-Dibromo-3-chloropropane	2872	Poison	2	2	0	
Di-n-butylamine	2248	Corrosive	**3**	**2**	**0**	
Di-n-butyl ether	1149	Flammable	**2**	**3**	**1**	
N,N'-dibutyl hexamethylene diamine			2	2	0	
Di-n-butyl ketone			1	2	0	
Di-tert-butyl peroxide	2102	Organic peroxide	**3**	**2**	**4**	**OX**
1,1-Di(tert-butylperoxy)cyclohexane	2179	Organic peroxide	3	3	3	
Dibutyl phenol			1	2	0	
Dibutyl phthalate			**0**	**1**	**0**	
Di-n-butyl phthalate			**0**	**1**	**0**	
Dicamba			1	0	0	
Dichlobenil			2	2	0	
Dichlone			2	0	0	
Dichloroacetic acid	1764	Corrosive	3	1	0	
Dichloroacetyl chloride	1765	Corrosive	**3**	**2**	**2**	**W**
Dichloroacetylene			3	0	0	
3,3'-Dichlorobenzidine			0	1	0	
Dichlorobromomethane			3	0	0	
Dichlorodifluoromethane	1028	Nonflammable gas	1	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

METHYL METHACRYLATE

(INHIBITED)

UN 1247

Shipping Name: Methyl methacrylate monomer, inhibited

Other Names: Diakon MMA
2-Methylacrylic acid, methyl ester MME
Methyl 2-methyl-2-propenoate

WARNING! • MAY REACT WITH ITSELF WITHOUT WARNING LEADING TO CONTAINER EXPLOSION!

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Very irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fruity odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 80-62-6

HYDRAZINE

UN 2029 (more than 64% or anhydrous)
UN 2030 (37% to 64%)
UN 3293 (not more than 37% hydrazine by mass)

Shipping Name: Hydrazine
Other Names: Diamide Diamine
Diamine hydrate Hydrazine hydrate

WARNING!

- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE LIQUID CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- HIGHLY REACTIVE! IGNITES SPONTANEOUSLY UPON CONTACT WITH POROUS MATERIALS SUCH AS WOOD, CLOTH, RUSTING METAL OR SOIL!

Hazards:

- Highly flammable; may continue to burn in the absence of air
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides
- Very corrosive to glass and rubber

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to slightly yellow oily fuming liquid
- Ammonia-like fishy odor
- Soluble in water
- Highly flammable; will ignite most porous material such as wood, cloth or rusting metal
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 35° F
- Commonly used as rocket fuel

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam only to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 302-01-2

HYDRAZINE SULFATE

Other Names: Diamine sulfate
Hydrazine hydrogen sulfate
Hydrazine monosulfate
Hydrazinium sulfate

Hazards:
- Extremely irritating to skin, eyes, nose and lungs
- May interfere with the body's abillity to use oxygen

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:
- White solid
- Weak ammonia-like odor
- Sinks in water and is slightly soluble in water
- Nonflammable

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 10034-93-2

ETHYLENEDIAMINE

UN 1604

Shipping Name: Ethylenediamine
Other Names: 1,2- Diaminoethane
Dimethylene diamine

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless thick liquid
- Ammonia-like odor
- Initially floats on the surface of water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 47° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-15-3

2,4-TOLUENEDIAMINE

UN 1709

Shipping Name: 2,4-Toluenediamine, or 2,4- Toluylenediamine

Other Names: 2,4-Diaminotoluene Toluene-2,4-diamine
Diaminotoluene Toluene diamine

Hazards:

- May interfere with the body's ability to use oxygen
- Vapors are heavier than air and will collect and stay in low areas
- Irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Description:

- Colorless solid
- No odor found
- Floats on the surface of water and is slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 95-80-7

DITHIAZANINE IODIDE

Other Names: Diazan
3,3'-Diethylthiadicarbocyanine iodide
Telmicid
Telmid

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic sulfur oxides, nitrogen oxides and hydrogen iodide

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:
- Dark green or blue violet solid or tablets
- No odor
- Insoluble in water
- Flammable

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from blowing, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not readily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 514-73-8

DIBROMOMETHANE

UN 2664

Shipping Name: Dibromomethane
Other Names: Methylene bromide
Methylene dibromide

Hazards:	**Description:**
● Irritating to skin, eyes, nose and lungs ● Container may BLEVE when exposed to fire ● Vapors are heavier than air and will collect and stay in low areas ● Decomposition products upon heating include toxic hydrogen bromide	● Colorless liquid ● Sweet chloroform-like odor ● Sinks in water and is slightly soluble in water ● Nonflammable ● Vapors are heavier than air and will collect and stay in low areas
Awareness and Operational Level Training Response: ● Stay upwind and uphill ● Determine the extent of the problem ● Isolate the area of release or fire and deny entry ● For container exposed to fire evacuate the area in all directions because of the risk of BLEVE ● Evacuate or shelter in place the immediate area and downwind for a large release ● Notify local health and fire officials and pollution control agencies ● If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water	**Operational Level Training Response:** RELEASE, NO FIRE: ● Stop the release if it can be done safely from a distance ● Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release ● Ventilate confined area if it can be done without placing personnel at risk FIRE: ● Material does not burn; fight surrounding fire with an agent appropriate for the burning material ● Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely ● If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 74-95-3

p-DICHLOROBENZENE

UN 1592

Other Names: 1,4-Dichlorobenzene, PDB, Dichloricide, Parazene, Paramoth, Paradichlorobenzene

Hazards:

- Vapors are irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White solid
- Mothball-like odor
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

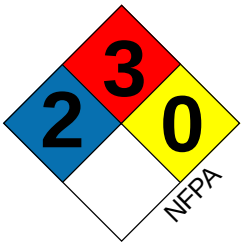
FIRE:

- Use water or foam to extinguish fire
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 106-46-7



PROPYLENE DICHLORIDE

UN 1279

Shipping Name: Propylene dichloride
Other Names: 1,2- Dichloropropane
Dichloro-1,2-propane

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, chloroform-like odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 78-87-5

DICHLOROBUTENE

UN 2924
UN 2920

Shipping Name: Dichlorobutene
Other Names: 1,4-Dichlorobutene
1,4-Dichloro-2-butene

Hazards:

- Irritating to skin, eyes, nose and lungs; prolonged contact will cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to straw colored liquid
- Sweet odor
- Sinks slowly in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes between 33° F and 38° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning
  liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-57-6

METHYL DICHLOROACETATE

UN 2299

Shipping Name: Methyl dichloroacetate
Other Names: Dichloroacetic acid, methyl ester
Methyl dichloroethanoate

Hazards:

- Severely irritating to skin, eyes, nose and lungs; even brief contact can cause burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion or decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, ether-like odor
- Sinks and reacts slowly with water to form toxic hydrochloric acid; is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

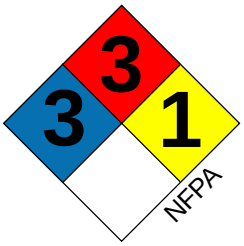
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 116-54-1



DIMETHYLDICHLOROSILANE

UN 1162

Shipping Name: Dimethyldichlorosilane
Other Names: Dichlorodimethylsilane
Dichlorodimethylsilicon
Inerton-DMCS
Inerton DW-DMC

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE!

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Corrosive to metals when exposed to moisture producing highly flammable hydrogen gas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless fuming liquid
- Sharp, pungent irritating smell like hydrochloric acid
- Sinks in water and decomposes in water to release hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

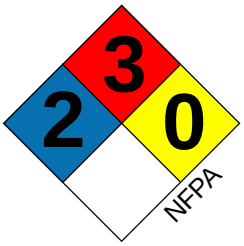
FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-78-5



ETHYLENE DICHLORIDE

UN 1184

Shipping Name: Ethylene dichloride

Other Names: 1,2-Dichloroethane, Ethylene chloride, Dichloroethane, 1,2-Ethlyene dichloride, Dutch oil, Freon 150

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-06-2

ETHYLPHENYL DICHLOROSILANE

UN 2435

Shipping Name: Ethylphenyldichlorosilane
Other Names: Dichloroethylphenylsilane

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIGOROUSLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE!

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

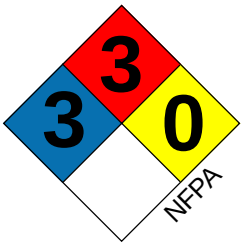
Description:
- Colorless liquid
- Sharp unpleasant odor
- Reacts with water producing toxic hydrochloric acid
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1125-27-5



ETHYL DICHLOROSILANE

UN 1183

Shipping Name: Ethyldichlorosilane
Other Names: Dichloroethylsilane
Monoethyldichlorosilane

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS WITH WATER TO FORM TOXIC HYDROCHLORIC ACID AND EXPLOSIVE HYDROGEN GAS!

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Irritating odor, similar to hydrochloric acid
- Sinks in water and reacts with water to form toxic hydrochloric acid and explosive hydrogen gas
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors.
- Material reacts with water but fire can be extinguished with medium expansion AFFF alcohol resistant foam
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1789-58-8

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
2,2-Dichloroisopropyl ether	2490	Poison	2	2	0	
Dichloromethylphenylsilane			2	3	1	
Dichloromonofluoromethane	1029	Nonflammable gas	1	0	0	
2,4-Dichlorophenol			1	1	0	
Dichlorophenoxyacetic esters			1	1	0	
2,3-Dichloropropene	2047	Flammable	**3**	**3**	**0**	
Dichloropropionic acid	1760	Corrosive	1	0	0	
Dichlorotetrafluoroethane	1958	Nonflammable gas	0	0	0	
2,2'-Dichlorotriethylamine			3	1	1	
Dichlorvos	2783	Poison	3	1	0	
Dicofol			2	1	0	
Dicrotophos			3	1	0	
Dieldrin	2761	Poison	3	0	0	
Diethanol amine			1	1	0	
Diethylaluminum chloride (DEA)			**3**	**4**	**3**	**W**
Diethylaluminum hydride				**3**	**3**	**W**
2,6-Diethyl aniline			2	2	0	
N,N-diethyl aniline	2432	Keep away from food	**3**	**2**	**0**	
Diethyl benzene	2049	Flammable	1	2	0	
Diethyl carbamazine citrate			2	1	0	
Diethyl chlorophosphate			4	1	0	
Diethylene glycol			**1**	**1**	**0**	
Diethylene glycol dibutyl ether			**1**	**1**	**0**	
Diethylene glycol dimethyl ether			**1**	**2**	**1**	
Diethylene glycol monobutyl ether			**1**	**2**	**0**	
Diethylene glycol monobutyl ether acetate			**1**	**1**	**0**	
Diethylene glycol monoethyl ether			**1**	**1**	**0**	
Diethylene glycol monomethyl ether			**1**	**1**	**0**	
Diethyl ethylphosphate			3	2	0	
Diethylphosphate			3	2	0	
Diethyl phthalate			**0**	**1**	**0**	
Diethyl stilbestrol			3	1	0	
Diethyl sulfate	1594	Poison	**3**	**1**	**1**	
Diethyl sulfide	2375	Flammable	1	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

DICHLOROMETHANE

UN 1593

Shipping Name: Dichloromethane
Other Names: Methylene bichloride
Methylene chloride
Methylene dichloride

Hazards:

- Harmful or fatal if swallowed; produces carbon monoxide in the body
- Combustion and decomposition products upon heating include toxic hydrogen chloride which is more toxic than the material itself
- Vapors are heavier than air and will collect and stay in low areas

Description:

- Colorless liquid
- Sweet odor
- Sinks in water and is slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Note to physician: converted to carbon monoxide in the body; if symptoms indicate; the initial treatment is oxygen

CAS: 75-09-2

METHYLDICHLOROSILANE

UN 1242

Shipping Name: Methyldichlorosilane
Other Names: Dichloromethylsilane

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM HYDROGEN CHLORIDE AND EXPLOSIVE HYDROGEN GAS!

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- When combined with surface moisture is corrosive to most common metals
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, fuming liquid
- Pungent, irritating odor
- Sinks in water and reacts violently with water to form hydrochloric acid and explosive hydrogen gas
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 107° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Reacts violently with water producing explosive hydrogen gas and hydrochloric acid. Fight fire with medium expansion AFFF alcohol resistant foam or dry chemical
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-54-7

DICHLOROPHENYL TRICHLOROSILANE

UN 1766

Shipping Name: Dichlorophenyltrichlorosilane

WARNING!

- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROCHLORIC ACID!

Hazards:

- Containers may BLEVE when exposed to fire
- Decomposition products upon heating include toxic hydrogen chloride
- Corrosive to common metals in the presence of moisture releasing flammable hydrogen gas

Description:

- Straw colored liquid
- Pungent odor
- Sinks in water and reacts vigorously with water to form toxic hydrochloric acid
- Flammable

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate a wide area around the release and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff water from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 27137-85-5

PHENYLDICHLOROARSINE

UN 1556

Shipping Name: Arsenic compound, liquid, n.o.s.
Other Names: Dichlorophenylarsine
Phenylarsine dichloride
TL 69

WARNING!
- POISON! BREATHING THE VAPOR, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion products include toxic fumes of arsine and hydrogen chloride

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Weak, but very unpleasant odor
- Sinks in water and is insoluble in water
- Reacts slowly with water to form toxic hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -4° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention immediately
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: if symptoms indicate, treatment is like that for arsine gas

CAS: 696-28-6

DICHLOROPROPENE

UN 2047

Shipping Name: Dichloropropenes

Other Names: 1,3-D; 1,3-Dichloropropene; Dichloropropylene; Dorlone; Nemex; Telone C; Vidden D

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow liquid
- Chloroform-like odor
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 542-75-6

DICHLOROSILANE

UN 2189

Shipping Name: Dichlorosilane
Other Names: Dichlorosilicone

WARNING!

- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE! MAY IGNITE SPONTANEOUSLY IN AIR!
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM HYDROCHLORIC ACID AND EXPLOSIVE HYDROGEN GAS!

Hazards:

- Gas is heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Description:

- Colorless gas which reacts with moisture to form a white cloud
- Shipped and stored as a compressed gas
- Very irritating odor
- Reacts violently with water to form hydrochloric acid and explosive hydrogen gas
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- REACTS WITH WATER TO PRODUCE HIGHLY EXPLOSIVE HYDROGEN GAS; if fire must be fought medium expansion AFFF alcohol resistant foam can be used
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 4109-96-0

ETHYL-BIS-(2-CHLOROETHYL)AMINE

UN 2734

Shipping Name: Amines, liquid, corrosive, flammable, n.o.s.
Other Names: 1,2'-Dichlorotriethylamine
Ethyl-S
HN1

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic nitrogen oxides and hydrogen chloride

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- A liquid
- Fish-like odor at low concentrations
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 538-07-8

DIESEL FUEL

NA 1993
UN 1202
Shipping Name: Diesel fuel
Other Names: Diesel
Fuel oil #2

Hazards:
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Yellow to dark brown liquid
- Gasoline-like odor
- Floats on water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

ETHYLENE GLYCOL DIETHYL ETHER

UN 1153

Shipping Name: Ethylene glycol diethyl ether

Other Names: 1,2-Diethoxyethane; Diethyl cellosolve; Diethyl glycol; 2-Ethoxyethyl ethyl ether; Ethyl glyme; Glyme-1

Hazards:
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sweet odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

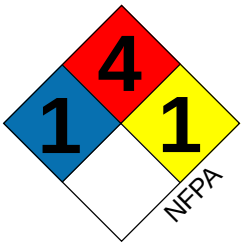
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 629-14-1



DIETHYL ETHER

UN 1155

Shipping Name: Diethyl ether
Other Names: Diethyl oxide
Ether
Ethyl ether
Ethyl oxide

WARNING!
- EXTREMELY FLAMMABLE!
- CONTAINERS THAT HAVE BEEN STORED OR OPENED MAY CONTAIN PEROXIDES THAT MAY EXPLODE WITH FRICTION, IMPACT OR HEAT!

Hazards:
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Clear colorless liquid
- Sweet pungent odor
- Floats on the surface of water and is moderately soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapors
- Boils at 94° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

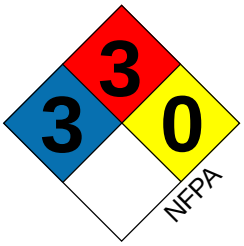
FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 60-29-7

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Diethyl zinc	1366	Spontaneously combustible	**3**	**4**	**3**	**W**
Difluorochloromethane	1018	Nonflammable	0	0	0	
Difluorodichloromethane	1028	Nonflammable	1	0	0	
1,1-Difluoroethylene	1959	Flammable gas	1	4	1	
Difluorophosphoric acid	1768	Corrosive	3	0	1	
Diglycidyl ether			4	2	0	
Diheptyl phthalate			0	1	0	
2,3-Dihydropyran	2376	Flammable	**2**	**3**	**0**	
Diisobutyl amine	2361	Flammable	**3**	**3**	**0**	
Diisobutyl carbinol			**1**	**2**	**0**	
Diisobutylene	2050	Flammable	**1**	**3**	**0**	
Diisobutyl ketone	1157	Flammable	**1**	**2**	**0**	
Diisobutyl pthalate			**0**	**1**	**0**	
Diisodecyl phthalate			**0**	**1**	**0**	
Diisononyl phthalate			0	1	0	
Diisooctyl phthalate			**0**	**1**	**0**	
Diisopropanol amine			**0**	**1**	**0**	
Diisopropyl benzene (all isomers)			**3**	**3**	**0**	
Diisopropyl benzene hydroperoxide	2171	Forbidden	0	2	0	
Diisopropyl ether	1159	Flammable	**1**	**3**	**1**	
Dimefox	3018	Poison	4	1	1	
Dimethoate			3	2	0	
Dimethyl adipate			1	1	0	
Dimethylamine, solution	1160	Flammable	**3**	**4**	**0**	
4-Dimethyl aminoazobenzene			2	2	0	
2-Dimethylaminoethanol	2051	Flammable	**2**	**2**	**0**	
Dimethyl carbonate	1161	Flammable	**3**	**3**	**0**	
N,N-Dimethyl cyclohexylamine			2	2	0	
Dimethylethanolamine	2051	Flammable	**2**	**2**	**0**	
Dimethyl ethylphosphonate			3	2	0	
Dimethyl glutarate			1	1	0	
Dimethylhexane dihydroperoxide	2174	Forbidden	1	2	3	OX
Dimethyl hydrogen phosphite			1	3	0	
Dimethyl mercury			3	1	0	
2,2-Dimethyl octanoic acid			1	2	0	
2,4-Dimethylphenol	2261	Poison	1	2	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



TRIETHYLAMINE

UN 1296

Shipping Name: Triethylamine

Other Names: (Diethylamino) ethane TEA
N,N-diethylethanamine TEN

Hazards:

- Highly flammable
- Severely irritating to skin and lungs; eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Liquid attacks some forms of plastics, rubber and coatings
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fish-like odor at low concentrations; ammonia-like odor at high concentrations
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

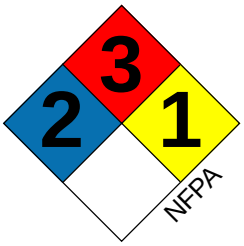
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 121-44-8



1,4-DIOXANE

UN 1165

Shipping Name: Dioxane
Other Names: 1,4-Diethylenedioxide
Diethylene ether
Diethylene oxide
p-Dioxane

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Faint ether-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 53° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 123-91-1

TETRAHYDROFURAN

UN 2056

Shipping Name: Tetrahydrofuran
Other Names: Diethylene oxide
1,4-Epoxybutane
Hydrofuran
Oxacyclopentane
Tetramethylene oxide
THF

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs; prolonged contact will cause burns
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Forms explosive peroxides upon prolonged storage
- Corrosive to some plastics

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Smells slightly fruity like acetone
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

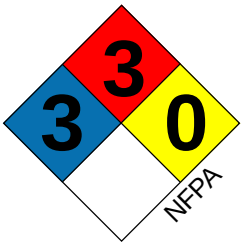
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-99-9



MORPHOLINE

UN 2054

Shipping Name: Morpholine
Other Names: Diethylene oximide
Diethylenimide oxide
2-H-1,4-oxazine
Tetrahydro-1,4-oxazine

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fishy or ammonia-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 23° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-91-8

1,2-DIETHYLHYDRAZINE

Hazards:

- Severely irritating to skin, eyes, nose and lungs; can cause burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- A liquid
- Fish-like odor at low concentrations; ammonia-like odor at high concentrations
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1615-80-1

FLUORINE

UN 1045 (Compressed gas)
NA 9192 (Cryogenic liquid)
Shipping Name: UN 1045 Fluorine, compressed
UN 9192 Fluorine, refrigerated liquid (cryogenic liquid)
Other Names: Difluorine

WARNING!

- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! FORMS EXPLOSIVE OR COMBUSTIBLE MIXTURES WITH MOST MATERIALS INCLUDING ALL FUELS AND MOST METALS!
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROFLUORIC ACID!

Hazards:

- Gas is heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Gas may explode in closed spaces (e.g., tanks, sewers, buildings) without an ignition source
- Contact with liquid may cause frostbite
- Corrosive to most metals

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Pale yellow or greenish yellow gas
- Pungent, irritating choking odor
- Stored and shipped as a compressed gas or cryogenic liquid in special cylinders without relief valves
- Reacts violently with water forming toxic hydrofluoric acid
- Nonflammable but may cause combustible materials to ignite
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting it burn.
- Material does not burn; fight surrounding fire with an agent appropriate for burning material; avoid water, if water must be used, use it in flooding quantities
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Toxic effects may be delayed
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: burns can be treated with calcium gluconate gel

CAS: 7782-41-4

OXYGEN DIFLUORIDE

UN 2190

Shipping Name: Oxygen difluoride
Other Names: Difluorine monoxide
Fluorine monoxide
Fluorine oxide

WARNING!
- EXPLOSIVE ! EXPLODES UPON CONTACT WITH AIR AND WATER!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE; MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Gas is heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Forms explosive reactions with adsorbents like silica gel, alumina and molecular sieve
- Contact with liquid may cause frostbite
- Decomposition products upon heating include toxic fluorine gas

Description:
- Colorless gas
- Foul odor
- Shipped and stored as a compressed gas
- Moderately soluble in water and reacts slowly in water to form hydrofluoric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: skin burns can be treated with calcium gluconate gel

CAS: 7783-41-7

DIFLUOROETHANE

UN 1030

Shipping Name: 1,1-Difluoroethane, R152a
Other Names: 1,1,-Difluoroethane
Ethylene fluoride
Freon 152

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Contact with liquid may cause frostbite
- Combustion products include the toxic gases hydrogen fluoride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- No odor
- Shipped and stored as a liquefied compressed gas
- May boil on the surface of water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- A liquid below -13° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed noncryogenic liquid containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-37-6

HYDROGEN PEROXIDE

(STABILIZED, GREATER THAN 60%)

UN 2015

Shipping Name: Hydrogen peroxidestabilized, greater than 60%
Other Names: Dihydrogen dioxide
Hydrogen dioxide
Hydrogen oxide

WARNING!
- CORROSIVE! MAY CAUSE SEVERE EYE AND SKIN BURNS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Containers may BLEVE when exposed to heat
- Reacts with iron, copper, brass and many other metals

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Shipped and stored in water solution
- Sharp irritating odor
- Soluble in water
- Nonflammable but may cause combustible materials to ignite

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7722-84-1

HYDROGEN SELENIDE

(ANHYDROUS)

UN 2202

Shipping Name: hydrogen selenide, anhydrous
Other Names: Dihydrogen selenide
Selenium dihydride

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Very irritating to skin, eyes, nose and lungs
- Containers may explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Colorless gas
- Offensive odor
- Soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

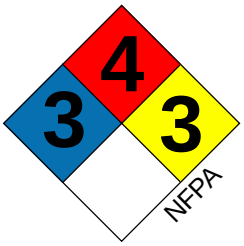
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- DO NOT ATTEMPT RESCUE!
- The contaminated vicitm poses a risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7783-07-5



ETHYLENE OXIDE

UN 1040

Other Names: Dihydrooxirene, Dimethylene oxide, 1,2-Epoxyethane, Epoxyethane, Ethenoxide, Ethyloxide, Oxane, Oxidoethane, Oxirane, Oxyacyclopropane

WARNING! ● EXTREMELY FLAMMABLE!
● MAY REACT WITH ITSELF WITHOUT WARNING WITH EXPLOSIVE VIOLENCE!

Hazards:

- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- Sweet ether-like odor
- Soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- Shipped and stored as a liquefied gas
- Becomes a liquid below 51° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

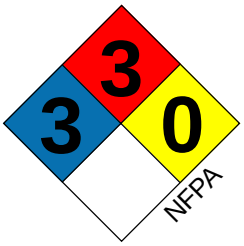
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-21-8



DIISOPROPYLAMINE

UN 1158

Shipping Name: Diisopropylamine
Other Names: DIPA

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fish-like odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-18-9

N,N-DIMETHYLANILINE

UN 2253

Shipping Name: N,N-Dimethylaniline
Other Names: Dimethyl aminobenzene
Dimethylanaline
Dimethyl phenylamine

Hazards:

- May interfere with the body's ability to use oxygen
- Irritating to skin, eyes, nose and lungs; prolonged contact will cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Pale yellow oily liquid
- No odor found
- Floats on the surface of water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 37° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

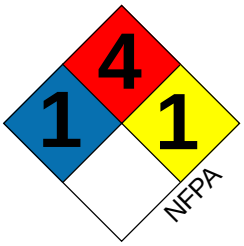
First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 121-69-7

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
2-Hexene			1	3	0	
3-Hexene			1	3	0	
Hexyl acetate			1	2	0	
Hexylene glycol			1	1	0	
HN_1 (N-Ethyl-2-2'di(chloroethyl) amine			4	1	0	
Hydrogen iodide, anhydrous	2197	Poison gas	3	3	0	
Hydrogen peroxide (35% solution)	2014	Oxidizer	1	0	1	OX
Hydroquinone	2662	Poison	2	1	0	
2-Hydroxyethyl acrylate			2	1	2	
Hydroxylamine sulfate	2865	Corrosive	1	0	1	
Hydroxypropyl acrylate			3	1	2	
Indeno(1,2,3-CD)pyrene			1	1	0	
Iron (powder)			0	2	0	
Isobenzan			4	0	0	
Isobutanol	1212	Flammable	1	3	0	
Isobutyl aldehyde	2045	Flammable	2	3	1	
Isobutylamine	1214	Flammable	2	3	0	
Isobutyl formate	2393	Flammable	2	3	0	
Isobutyric acid	2529	Flammable	1	2	0	
Isodecaldehyde			0	2	0	
Isodrin			3	1	0	
Isofluorphate			4	1	0	
Isooctaldehyde	1191	Flammable	1	2	0	
Isooctane	1262	Flammable	0	3	0	
Isooctyl alcohol			**1**	**2**	**0**	
Isopentane	1265	Flammable	1	4	0	
Isophorone			2	2	0	
Isophorone diamine	2289	Poison	1	1	0	
Isophorone diisocyanate (IPDI)	2290	Poison	2	1	1	
Isophthalic acid			1	1	0	
Isopropenyl acetate	2403	Flammable	2	3	0	
Isopropyl chloride	2356	Flammable	2	4	0	
Isopropyl cyclohexane			1	3	0	
Isopropyl ether			1	3	1	
4,4'-Isopropylidenediphenol			0	1	0	
Isopropylmethylpyrazolyl dimethyl carbamate			4	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



DIMETHYL ETHER

UN 1033

Shipping Name: Dimethyl ether
Other Names: Methyl ether
Methyl oxide
Wood ether

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Exposure of cylinders to fire and flame or elevated temperatures may cause cylinder to rupture or frangible disc to burst, releasing entire contents of cylinder. Ruptured or venting cylinders may rocket through buildings and/or travel a considerable distance
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin and eyes
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless compressed gas
- Sweet, ether-like odor
- Liquid floats on water and dissolves slowly in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid below -12° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

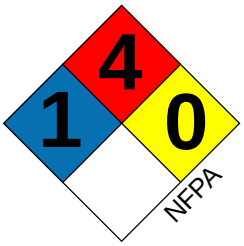
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat form fire or flame contact, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 115-10-6



DIMETHYL SULFIDE

UN 1164

Shipping Name: Dimethyl sulfide
Other Names: Dimethyl monosulfide
DMS
Methyl sulfide
2-Thiopropane

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to pale yellow liquid
- Cabbage-like odor
- Floats on the surface of water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils at 100° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-18-3

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Dimethyl phthalate			**0**	**1**	**0**	
Dimethyl polysiloxane			0	1	0	
2,2-Dimethylpropane	2044	Flammable gas	**0**	**4**	**0**	
2,2-Dimethylpropane-1,3-diol			1	3	0	
Dimethyl succinate			0	2	0	
Dimethyl sulfoxide			**1**	**1**	**0**	
Dimethyl terephthalate			**1**	**1**	**0**	
Dimethyl tetracholorterephthalate			1	1	0	
Dimetilan			3	1	0	
Dinitrochlorobenzene	1577	Poison	**3**	**1**	**4**	
4,6-Dinitro-o-cyclohexyl phenol	9026		2	2	2	
2,4-Dinitrotoluene	2038	Poison	**3**	**1**	**3**	
Dinonyl phthalate			0	1	0	
Dinoterb			3	2	3	
Dioctyl adipate			**0**	**1**	**0**	
Dioctyl phthalate			**0**	**1**	**0**	
Di-n-octyl phthalate			**0**	**1**	**0**	
Dioctyl sodium sulfosuccinate			0	0	0	
Dioxathion			3	0	0	
Dipentene	2052	Flammable	**0**	**2**	**0**	
Diphacinone			3	1	0	
Diphenamide			1	0	0	
Diphenyl			**2**	**1**	**0**	
Diphenylamine			**3**	**1**	**0**	
Diphenylamine chloroarsine	1698	Poison	3	2	0	
Diphenyldichlorosilane	1769	Corrosive	**3**	**1**	**0**	
Diphenyl ether			**1**	**1**	**0**	
Diphenylmethane diisocyanate	2489	Poison	2	1	1	
Diphosgene	1076	Poison gas	4	0	1	
Dipropylene glycol			**0**	**1**	**0**	
Dipropylene glycol dibenzoate			0	1	0	
Dipropylene glycol methyl ether			**0**	**2**	**0**	
Diquat	2781	Poison	2	0	0	
Direct black 38			1	1	0	
Direct blue 6			1	1	0	
Direct brown 95			0	1	0	
Disulfoton	2783	Poison	4	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

DIMETHYL SULFATE

UN 1595

Shipping Name: Dimethyl sulfate
Other Names: Methyl sulfate
Sulfuric acid, dimethyl ester

WARNING!
- POISON! BREATHING THE VAPOR OR SWALLOWING THE LIQUID CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor and irritation are not reliable indicators of the presence of toxic amounts of gas
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless, oily liquid
- Faint onion-like odor
- Decomposes in water to form toxic sulfuric acid
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -25° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 77-78-1

DIMETHYLPHOSPHORO CHLORIDOTHIOATE

UN 2267

Other Names: Dimethyl thiophosphoryl chloride
Methyl PCT
Phosphorochloridothioic acid, O,O-dimethyl ester

Hazards:

- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin causes burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen chloride and sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light amber liquid
- Insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- An organophosphate insecticide

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, atropine is the initial antidote

CAS: 2524-03-0

DIMETHYL ZINC

UN 1370

Shipping Name: Dimethylzinc
Other Names: Methyl zinc
Zinc methyl

WARNING!
- EXTREMELY FLAMMABLE! MAY IGNITE SPONTANEOUSLY IN AIR!
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM EXPLOSIVE METHANE GAS!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic zinc oxide gas

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Liquid is odorless but burns with a garlic odor
- Reacts violently with water producing explosive methane gas
- Extremely flammable
- Autoignites at temperatures less than 0° F
- Boils at 115° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; if possible let fire burn - there is a good chance of explosive re-ignition
- DO NOT USE WATER! Use dry soda ash, dry graphite or other inert powder to extinguish
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 544-97-8

TABUN

Other Names: Dimethylamidoethoxyphosphoryl cyanide; Ethyl N,N'-dimethylphosphoramidocyanidate; GA; Gelan I; MCE; Trilon 83

WARNING!
- POISON! BREATHING THE VAPOR, SKIN OR EYE CONTACT, OR SWALLOWING THE MATERIAL CAN KILL YOU!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- REACTS WITH WATER OR ACID TO PRODUCE TOXIC HYDROGEN CYANIDE!

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic nitrogen oxides and cyanide

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area of release or fire, deny entry and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to brown liquid
- Fruit-like odor, or like bitter almonds
- Reacts quickly with water to produce toxic hydrogen cyanide and is slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Very volatile
- An organophosphate insecticide used as a war nerve agent

Operational Level Training Response:
RELEASE, NO FIRE:
- BACK OFF! - Isolate a wide area around the release and call for expert help
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Combustion products are less toxic than the compound itself.
- If material is involved in a fire which must be extinguished, use an agent appropriate for the burning material using unattended equipment. Be aware that hydrogen cyanide is produced when the material is mixed with water.

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, initial treatment includes atropine

CAS: 77-81-6

DIMETHYLAMINE

(ANHYDROUS)

UN 1032

Shipping Name: Dimethylamine, anhydrous
Other Names: DMA
N-methyl-methanamine

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Containers or gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid can cause frostbite
- Combustion products include highly toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- Shipped or stored as a compressed liquefied gas or in water solution
- Fishy, ammonia-like odor
- Soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid below 44° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse gas - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control gas
- Ventilate confined area if it can be done without placing personnel at risk

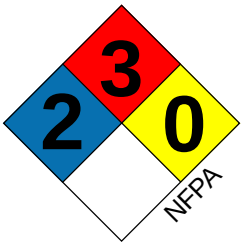
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 124-40-3



XYLENES

UN 1307

Shipping Name: Xylenes

Other Names: 1,2-Dimethylbenzene; 1,3-Dimethylbenzene; 1,4-Dimethylbenzene; meta-Xylene; ortho-Xylene; para-Xylene; Xylol

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin and eyes

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Benzene or gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1330-20-07 (mixed); 95-47-6 (ortho, o-); 108-38-3 (meta, m-); 106-42-3 (para, p-)

NEOHEXANE

UN 1208

Shipping Name: Hexanes
Other Names: 2,2-Dimethylbutane

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Petroleum-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-83-2

ISOPROPANOL

UN 1219

Shipping Name: Isopropanol

Other Names: Dimethylcarbinol, 2-Propanol, Isopropyl alcohol, sec-Propyl alcohol, 1-Methyl ethyl alcohol, Rubbing alcohol

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors may explode in closed spaces (e.g., tanks, sewers, buildings) if exposed to fire
- Irritating to skin and eyes

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Odor like rubbing alcohol
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

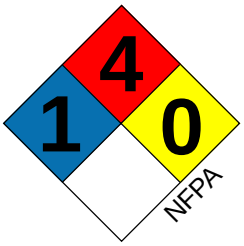
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 67-63-0



ISOBUTANE

UN 1969

Shipping Name: Isobutane
Other Names: 1,1-Dimethylethane
2-Methylpropane
Trimethylmethane

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Containers may explode or BLEVE when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid may cause frostbite

Description:

- Colorless gas
- Gasoline-like odor
- Liquid floats on the surface of water and boils forming a visible vapor cloud; is insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- A liquid below 10° F

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-28-5

DIMETHYLFORMAMIDE

UN 2265

Shipping Name: Dimethylformamide
Other Names: DMF
DMFA
N,N-Dimethyl formamide
N-Formyldimethylamine

Hazards:

- Container may BLEVE or explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to slightly yellow liquid
- Fish-like odor
- Soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

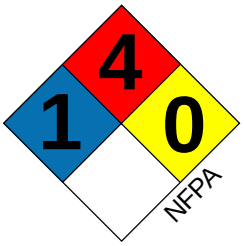
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 68-12-2



PROPANE

UN 1978

Shipping Name: Propane or Propane mixture
Other Names: Dimethylmethane

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Container may explode or BLEVE when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Exposure to the liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas
- Faint petroleum-like odor
- Shipped and stored as a liquefied gas under its own pressure
- Liquid floats on the surface of water and boils; is insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

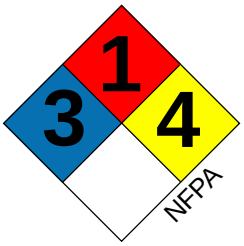
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-98-6



DINITROBENZENES

UN 1597

Shipping Name: Dinitrobenzenes

Other Names: 1,2-Dinitrobenzene
1,3-Dinitrobenzene
1,4-Dinitrobenzene
m-Dinitrobenzene
o-Dinitrobenzene
p-Dinitrobenzene
Dithane A-4

WARNING!
- POISON! BREATHNIG THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- CONTAINER MAY EXPLODE WHEN EXPOSED TO HEAT OR SHOCK!

Hazards:

- May interfere with the body's ability to use oxygen
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- If containers are exposed to heat or flame BACK OFF! MATERIAL WILL EXPLODE! Isolate a wide area around release deny entry and call for expert help
- Stay uphill and upwind
- Determine the extent of the problem
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White to pale yellow solid
- Sinks and dissolves slowly in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent material or contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If containers are exposed to direct flame or elevated temperatures, BACK OFF to a secure location; consider letting fire burn
- Material does not readily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 100-25-4 (para, p-) 528-29-0 (ortho, o-) 99-65-0 (meta, m-)

NITROUS OXIDE

UN 1070 (Compressed gas)
UN 2201 (Refrigerated liquid)

Shipping Name: Nitrous oxide, compressed
Nitrous oxide, refrigerated liquid

Other Names: Dinitrogen monoxide Nitrogen oxide
Laughing gas

Hazards:

- Container may explode or BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Contact with liquid may cause frostbite
- May form explosive mixtures with air at elevated temperatures
- Decomposition products upon heating include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas
- Shipped and stored as a cryogenic liquid
- Slightly sweet odor
- Soluble in water
- Nonflammable but will support combustion
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water

CAS: 10024-97-2

NITROGEN DIOXIDE

UN 1067

Shipping Name: Dinitrogen tetroxide, liquefied
Other Names: Dinitrogen tetroxide
Nitrogen oxide
Nitrogen tetroxide
Oxides of nitrogen

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Vapors are heavier than air and will collect and stay in low areas
- Irritating to skin, eyes, nose and lungs; can cause burns of the skin, eyes and nose
- Container may BLEVE or explode when exposed to fire
- Use water with caution - reacts with water to form nitric acid and nitrous acid
- May interfere with the body's ability to use oxygen

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Yellow liquid or red-brown gas
- Pungent, irritating odor
- Reacts with water to form toxic nitric acid
- Nonflammable but may cause combustibles to ignite
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils at 70° F; Freezes at 17° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

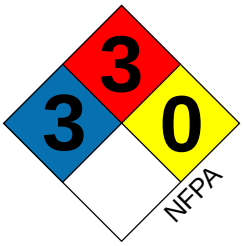
FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 10102-44-0



DIPROPYLAMINE

UN 2383

Shipping Name: Dipropylamine
Other Names: Di-n-propylamine
N-Dipropylamine

Hazards:

- Severely irritating to skin, eyes, nose and lungs; can cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Fish-like odor at low concentrations; ammonia-like odor at high concentrations
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to knock down vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 142-84-7

OXYGEN

UN 1072 (Compressed gas)
UN 1073 (Refrigerated liquid)

Shipping Name: Oxygen, compressed
Oxygen, refrigerated liquid (cryogenic liquid)

Other Names: Dioxygen; LOX; Liquid oxygen; Molecular oxygen

WARNING! • STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Contact with liquid may cause frostbite
- Gas is heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials

Description:

- Colorless gas or light blue liquid; shipped and stored as a compressed gas or cryogenic liquid
- No odor
- Sinks in water and boils in water
- Nonflammable but may cause combustibles to ignite
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Seek medical attention
- Frostbite - warm injured area in very warm water

CAS: 7782-44-7

PHOSPHORUS PENTASULFIDE

UN 1340

Shipping Name: Phosphorus pentasulfide
Other Names: Diphosphorus pentasulfide
Phosphoric sulfide
Phosphorus persulfide
Sulfur phosphide
Thiophosphoric anhydride

WARNING! • DO NOT USE WATER! REACTS WITH WATER TO FORM PHOSPHORIC ACID AND HIGHLY TOXIC HYDROGEN SULFIDE!
• MATERIAL MAY PRODUCE HEAT AND SPONTANEOUSLY IGNITE IN THE PRESENCE OF MOISTURE!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may explode when exposed to fire
- Combustion products include the toxic sulfur oxide, phosphorous pentoxide, hydrogen sulfide gases and phosphoric acid
- Interferes with the body's ability to use oxygen

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- If in a confined area STAY OUT - toxic hydrogen sulfide may be released
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Greenish-yellow, greenish-gray or grayish-yellow solid
- Rotten egg-like odor
- Sinks in water and reacts with water to form toxic hydrogen sulfide and phosphoric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- DO NOT allow water to come in contact with the material
- If material is on fire and conditions permit, DO NOT EXTINGUISH - fight fire with carbon dioxide or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other sign of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can cause sulfhemglobinemia; if symptoms indicate, amyl nitrate is the initial antidote

CAS: 1314-80-3

OLEUM

UN 1831

Shipping Name: Sulfuric acid, fuming
Other Names: Disulfuric acid
Fuming sulfuric acid

WARNING!
- POISON! BREATHING THE VAPORS OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposition products upon heating include toxic sulfur oxides
- Corrosive to most metals

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless oily, fuming liquid
- Choking odor
- Produces heat when mixed with water and is soluble in water
- Nonflammable but may cause combustibles to ignite
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 8014-95-7

DIMETHYL DISULFIDE

UN 2381

Shipping Name: Dimethyl disulfide
Other Names: Dithiabutane
Methyl disulfide

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- A liquid
- Odor like human waste
- Sinks in water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 624-92-0

FURAN

UN 2389

Shipping Name: Furan
Other Names: Divinylene Oxide
Oxacyclopentadiene

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Very irritating to skin, eyes, nose and lungs; prolonged contact can cause burns to eyes
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Description:

- Clear colorless liquid that turns brown upon standing
- Mild pleasant odor
- Floats on the surface of water and is slightly soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 90° F
- Produces large amounts of vapors

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

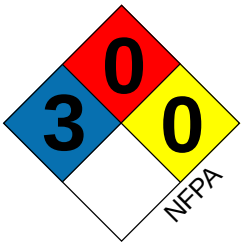
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-00-9



PENTACHLOROPHENOL

UN 3155

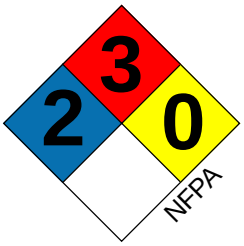
Shipping Name: Pentachlorophenol
Other Names: Dowcide 7
PCP
Woodtreat

Hazards:	**Description:**
● Irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns ● Container may explode when exposed to fire ● Decomposition products upon heating include toxic hydrogen chloride ● Solutions of material are flammable	● Colorless to grey solid ● Sweet phenol-like odor ● Sinks in water and is insoluble in water ● Nonflammable ● May be shipped and stored as a solution in a flammable solvent
Awareness and Operational Level Training Response: ● Stay upwind ● Determine the extent of the problem ● Isolate the area of release or fire and deny entry ● Notify local health and fire officials and pollution control agencies ● If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water	**Operational Level Training Response:** RELEASE, NO FIRE: ● Cover material to protect from wind, rain or spray ● Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release ● Ventilate confined area if it can be done without placing personnel at risk FIRE: ● Solid material does not burn; fight surrounding fire with an agent appropriate for the burning material ● Material in solution will burn, fight fire with foam or water ● Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely ● If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 87-86-5



ETHYLBENZENE

UN 1175

Shipping Name: Ethylbenzene
Other Names: EB
Phenylethane

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g.. tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet, gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 100-41-4

ETHYLENE GLYCOL MONOMETHYL ETHER

UN 1188

Shipping Name: Ethylene glycol monomethyl ether

Other Names:		
	EGM	2-Methoxyethanol
	EGME	Ethylene glycol methyl ether
	Methyl cellosolve	Glycol methyl ether

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flash back
- Slightly irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Mild, sweet, ether-like smell
- Initially floats on the surface of water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

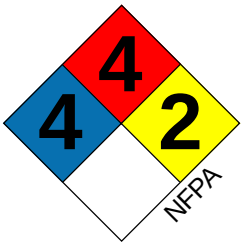
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 109-86-4



PHOSPHORUS

UN 1381 (Dry, under water or in water solution)
UN 2447 (White molten)

Shipping Name: UN 2447 Phosphorus, white, molten
UN 1381 Phosphorus white, dry or under water or in solution; Phosphorus, yellow dry or under water or in solution.

Other Names: Elemental phosphorus; White phosphorus; Molten phosphorus; Yellow phosphorus

WARNING!
- POISON! BREATHING THE VAPORS OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear including SCBA does not provide adequate protection. If exposure to the chemical occurs, remove and isolate gear immediately and thoroughly decontaminate personnel.
- EXTREMELY FLAMMABLE! WILL BURN SPONTANEOUSLY UPON CONTACT WITH AIR!

Hazards:
- Will re-ignite after fire is extinguished if still exposed to air

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of spill or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

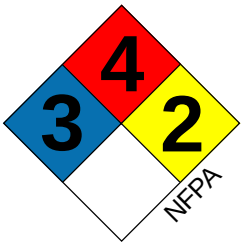
Description:
- Soft waxy solid
- Sharp garlic-like smell
- Sinks in water and is slightly soluble in water
- Stable under water or when excluded from air; burns spontaneously in air
- Extremely flammable
- Melts at 111° F to a yellow or white liquid

Operations Level Training Response:
RELEASE, NO FIRE:
- Flood with water spray or fog
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Fight fire with large amounts of water spray or fog, dry chemical, earth or sand
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support (CPR) as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7723-14-0



PROPYLENE OXIDE

UN 1280

Shipping Name: Propylene oxide
Other Names: 1,2-Epoxypropane
Epoxy propane
Methyloxirane
Propene oxide

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear colorless liquid
- Sweet ether-like odor
- Soluble in water
- Shipped under a blanket of nitrogen
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils at 94° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, vent sound suddenly increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-56-9

STYRENE OXIDE

Other Names: Epoxyethylbenzene
2-Phenyloxirane
Styrene-7,8-oxide

WARNING! • MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- May react vigorously with water in the presence of acids or alkalis

Description:
- Colorless to yellow liquid
- Sweet odor
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

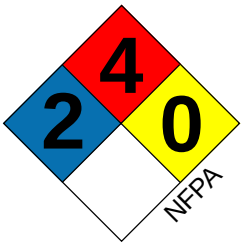
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, vent sound suddenly increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 96-09-3



ETHYL MERCAPTAN

UN 2363

Shipping Name: Ethyl mercaptan

Other Names: Ethanethiol, Ethyl hydrosulfide, Ethyl sulfhydrate, Thioethanol, Thioethylalcohol

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Skunk-like odor; smells like garlic at low concentrations
- Moderately soluble and floats on the surface of water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 94° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

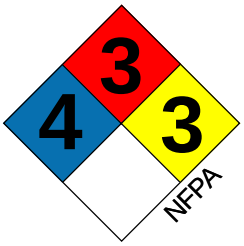
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-08-1



PROPARGYL ALCOHOL

NA 1986

Shipping Name: Propargyl alcohol
Other Names: Ethinylcarbinol
3-Hydroxy-1-propyne
2-Propynol
Propynyl alcohol

WARNING!
- POISON! BREATHING THE VAPOR, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- MAY REACT WITH ITSELF WITHOUT WARNING WITH EXPLOSIVE VIOLENCE!

Hazards:

- Highly flammable
- Very irritating to skin, eyes, nose and lungs
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Mild, geranium-like odor
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and the consequences are acceptable, DO NOT EXTINGUISH.
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-19-7

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Ethinylestradiol			1	1	0	
Ethion	2783	Poison	3	1	0	
Ethoprophos			3	1	0	
Ethoxydihydropyran			**2**	**2**	**1**	
Ethoxyethylbenzene			1	2	0	
Ethoxylated dodecanol			2	1	0	
Ethoxylated nonylphenol			0	1	0	
Ethoxylated pentadecanol			2	1	0	
Ethoxylated tetradecanol			2	1	0	
Ethoxylated tridecanol			2	1	0	
Ethoxy triglycol			**0**	**1**	**0**	
Ethyl acetoacetate			**2**	**2**	**0**	
Ethylacetylene	2452	Flammable gas	1	4	2	
Ethyl aluminum dichloride			**3**	**3**	**3**	**W**
Ethyl aluminum sesquichloride			**3**	**3**	**3**	**W**
Ethyl amyl ketone	2271	Flammable	0	2	0	
N-ethylaniline	2272	Keep away from food	**3**	**2**	**0**	
Ethyl azinphos			4	1	0	
Ethyl bromide	1891	Poison	**2**	**1**	**0**	
Ethyl bromoacetate	1603	Poison	**2**	**2**	**0**	
Ethyl butanol	2275	Flammable	**1**	**2**	**0**	
Ethyl butyl ether	1179	Flammable	**2**	**3**	**0**	
Ethyl carbamate			1	1	0	
Ethyl chlorothioformate	2826	Corrosive	0	1	0	
Ethyl cyclohexane			**1**	**3**	**0**	
N-ethyl cyclohexylamine			**3**	**3**	**0**	
N-ethyl-2,2'-di(chloroethyl) amine (HN_1)			4	1	0	
Ethylenediamine tetracetic acid	9117		1	0	0	
Ethylene glycol			**1**	**1**	**0**	
Ethylene glycol acetate			**0**	**1**	**0**	
Ethylene glycol diacetate			**1**	**1**	**0**	
Ethylene glycol isopropyl ether			1	3	0	
Ethylene glycol monobutyl ether	2369	Flammable	**2**	**2**	**0**	
Ethylene glycol monobutyl ether acetate			**1**	**2**	**0**	
Ethylene glycol monoethyl ether acetate	1172	Flammable	**1**	**2**	**0**	
Ethylene glycol phenyl ether			**0**	**1**	**0**	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

ETHYLENE GLYCOL MONOETHYL ETHER

UN 1171

Shipping Name: Ethylene glycol monoethyl ether

Other Names: 2-Ethoxyethanol Ethylene glycol ethyl ether
Ethyl cellosolve Ethyl glycol

Hazards:
- Container may BLEVE when exposed to fire
- Irritating to eyes and nose
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Ether-like odor
- Soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 110-80-5

ETHYL FORMATE

UN 1190

Shipping Name: Ethyl formate
Other Names: Ethyl methanoate
Formic acid, ethyl ester
Formic ether

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose; very irritating to lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Rum-like odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-94-4

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Ethylene thiourea			2	1	0	
Ethyl-3-ethoxypropionate			0	2	0	
Ethyl hexaldehyde	1191	Flammable	**2**	**2**	**1**	
2-Ethyl hexanoic acid			1	1	0	
2-Ethyl hexanol			1	2	0	
2-Ethyl hexylamine	2276	Corrosive	**2**	**2**	**0**	
Ethyl hexyl tallate			2	1	0	
Ethylidene norbornene			2	2	0	
Ethyl lactate	1192	Flammable	**2**	**2**	**0**	
Ethyl methacrylate	2277	Flammable	**2**	**3**	**0**	
Ethyl methane sulfonate			2	1	0	
Ethyl methyl ether	1039	Flammable gas	**1**	**4**	**1**	
Ethyl nitrate	1993	Combustible	**2**	**3**	**4**	
Ethyl phenol			**2**	**1**	**0**	
Ethyl phosphonothioic dichloride	2927	Poison	3	1	1	₩
Ethylphosphonous dichloride	2845	Spontaneously Combustible	3	4	3	
Ethylphosphonous difluoride			3	4	3	
Ethylphosphonyl difluoride			3	4	3	
Ethyl phosphorodichloridate	2927	Poison	3	1	1	₩
Ethyl pirimifos			3	1	0	
2-Ethyl-3-propyl acrolein			**2**	**2**	**1**	
Ethyl silicate	1292	Flammable	**2**	**2**	**0**	
Ethyl sulfate	1594	Poison	**3**	**1**	**1**	
Ethyl t-butyl ether			**2**	**3**	**0**	
2-Ethyltoluene			2	**2**	**0**	
F 12	1028	Nonflammable gas	1	0	0	
F 22	1018	Nonflammable gas	0	0	0	
Fenamiphos			3	1	0	
Fenitrothion			3	1	0	
Fensulfothion	2783	Poison	4	1	0	
Ferric ammonium citrate	9118		0	0	0	
Ferric ammonium oxalate	9119		0	0	0	
Ferric chloride	1773	Corrosive	1	0	0	
Ferric fluoride	9120		3	0	0	
Ferric glycerophosphate			2	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

ETHYL THIOCYANATE

Other Names: Ethyl rhodanate
Ethyl sulfocyanate
Thiocyanic acid, ethyl ester

Hazards:

- Very irritating to skin, eyes, nose and lungs
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposition products upon heating include toxic nitrogen and sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- No odor found
- Floats or sinks in water depending upon the temperature and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 542-90-5

VINYL ETHYL ETHER

(INHIBITED)

UN 1302

Shipping Name: Vinyl ethyl ether, inhibited
Other Names: Ethyl vinyl ether

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Description:
- Colorless liquid
- Ether-like odor
- Floats on the surface of water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils at 96° F

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting suddenly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-92-2

ETHYLENE FLUOROHYDRIN

Other Names: 2-Fluoroethanol

WARNING!
- POISON! BREATHING THE VAPOR, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion and decomposition products upon heating include toxic hydrogen fluoride gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- A liquid
- Color and odor not found
- Soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -15° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed

CAS: 371-62-0

TETRACHLOROETHYLENE

UN 1897

Shipping Name: Tetrachloroethylene

Other Names: Ethylene tetrachloride
PCE
PERC
Perchlor
Perchloroethylene
Perclene

Hazards:
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Irritating to skin, eyes, nose and lungs
- Decomposition products upon heating include toxic hydrogen chloride

Description:
- Colorless liquid
- Sweet chloroform-like odor
- Sinks in water and is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -8° F

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 127-18-4

PROPIONIC ACID

UN 1848

Shipping Name: Propionic acid

Other Names: Ethylformic acid, Luprisol, Methyl acetic acid, Propanoic acid, Prozoin

Hazards:

- Very irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns and blindness
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, oily liquid
- Pungent rancid odor
- Initially floats on the surface of water and is soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -6° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a non-flammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 79-09-4

ETHYLTRICHLOROSILANE

UN 1196

Shipping Name: Ethyltrichlorosilane
Other Names: Trichloroethylsilane
Trichloroethyl silicon

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU ! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIGOROUSLY WITH WATER TO FORM HYDROCHLORIC ACID AND HEAT!

Hazards:

- Highly flammable
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explode
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless fuming liquid
- Intolerable pungent odor
- Reacts vigorously with water to form hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 115-21-9

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Ferric nitrate	1466	Oxidizer	0	0	0	OX
Ferric sulfate	9121		1	0	0	
Ferrous ammonium sulfate	9122		0	0	0	
Ferrous chloride	1759	Corrosive	2	0	0	
Ferrous fluoroborate			1	0	0	
Ferrous oxalate			0	0	0	
Ferrous sulfate	9125		2	0	0	
Fluenetil			3	1	0	
Fluoboric acid	1775	Corrosive	**3**	**0**	**0**	
Fluometuron			1	1	0	
Fluoranthene			0	1	0	
Fluorene			1	1	0	
Fluoroacetamide			4	1	0	
Fluoroacetyl chloride			4	1	2	~~W~~
2-Fluoroaniline	2941	Poison	2	2	0	
4-Fluoroaniline	2941	Poison	2	2	0	
4-Fluorotoluene	2388	Flammable	2	2	0	
Fonofos	2783	Poison	4	1	0	
Forane 22B			1	0	0	
Formamide			**2**	**1**	**0**	
Formetanate hydrochloride			3	1	0	
Formothion			2	1	0	
Formparanate			3	1	0	
Formyl hydrazino-4-(5-nitro-2-furyl)thiazole			3	1	0	
Fosthietan			4	1	0	
Freon 12	1028	Nonflammable gas	1	0	0	
Freon 22	1018	Nonflammable gas	0	0	0	
Fuberidazole			1	1	0	
Fuel oil, No. 2	1993	Combustible	0	2	0	
Fumaric acid			0	1	0	
Furfuryl alcohol	2874	Poison	**1**	**2**	**1**	
Fusel oil	1201	Flammable	**1**	**2**	**0**	
Gallic acid			1	1	0	
Gallium metal	2803	Corrosive	2	0	0	
Gallium trichloride			**3**	**0**	**1**	
Germane	2192	Poison gas	**4**	**4**	**3**	~~**W**~~

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

FLUOROSILICIC ACID

UN 1778

Shipping Name: Fluorosilicic acid

Other Names: FKS, Fluosilicic acid, Hexafluosilicic Acid, Silicofluoric acid, Sand acid, Hydrogen hexafluorosilicate

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposition products upon heating include toxic hydrogen fluoride
- Corrosive to glass and stoneware

Description:
- Colorless to straw colored liquid
- Unpleasant sour odor
- Soluble in water with the release of heat
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 63° F

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: skin burns can be treated with calcium gluconate gel

CAS: 16961-83-4

METHANESULFONYL FLUORIDE

Other Names: Fumette
MSF

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Irritating to skin, eyes, nose and lungs even at low concentrations
- Container may BLEVE when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen fluoride and sulfur oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Clear colorless liquid
- No odor found
- Slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

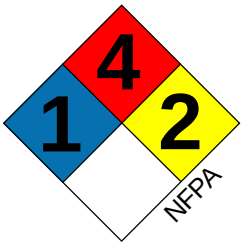
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: material is a cholinesterase inhibitor; if symptoms indicate, initial antidote is atropine. Hydrofluoric acid burns can be treated with calcium gluconate gel

CAS: 558-25-8



VINYL FLUORIDE

(INHIBITED)

UN 1860

Shipping Name: Vinyl fluoride, inhibited

Other Names: 1-Fluoroethene
Fluoroethene
Fluoroethylene
Monofluoroethene

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen fluoride gas
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless compressed gas
- Sweet ether-like odor
- Liquid floats on the surface of water and boils and is insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-02-5

FLUOROSULFONIC ACID

UN 1777

Shipping Name: Fluorosulfonic acid
Other Names: Fluorosulfuric acid

WARNING!

- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROGEN FLUORIDE AND SULFURIC ACID MIST!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Reacts with metals generating flammable hydrogen gas
- Decomposition products upon heating include toxic hydrogen fluoride and sulfur oxides

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless fuming liquid
- Acrid odor
- Reacts violently with water forming toxic hydrofluoric and sulfuric acids
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor when exposed to water or moisture

Operational Level Training Response:

RELEASE, NO FIRE:

- DO NOT USE WATER DIRECTLY ON THE PRODUCT. Reacts violently with water to form toxic hydrofluoric and sulfuric acids
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material - if possible, do not allow water to come in contact with material; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7789-21-1

FORMALDEHYDE

(SOLUTION)

UN 1198 (Solutions, flammable)
UN 2209 (Solution)

Shipping Name: UN 1198 Formaldehyde, solutions, flammable
UN 2209 Formaldehyde, solutions with not less than 25% formaldehyde

Other Names: Formalin, Methaldehyde, Methanal, Methylaldehyde, Methylene Oxide, Oxymethylene

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Severely irritating; can cause burns of skin, eyes, nose and lungs
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless or cloudy liquid
- Usually shipped as a solution in water (30 to40%) or methanol (0 to 15%)
- Pungent and irritating odor
- Soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 50-00-0

ISOPROPYL FORMATE

UN 1281

Shipping Name: Propyl formates

Other Names: Formic acid isopropyl ester

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Description:

- Colorless liquid
- Pleasant smell
- Floats on the surface of water; is slightly soluble in water
- Slowly decomposes in water to form formic acid and isopropyl alcohol
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated run ff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

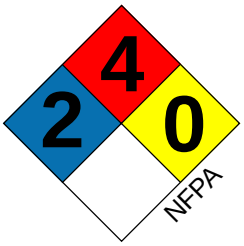
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 625-55-8



METHYL FORMATE

UN 1243

Shipping Name: Methyl formate
Other Names: Formic acid, methyl ester
Methyl methanoate

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Very irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Description:

- Colorless liquid
- Pleasant fruity odor
- Initially floats on the surface of water and is soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 89° F

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of the release and deny entry
- Remove all ignition sources
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam only to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-31-3

FURFURAL

UN 1199

Shipping Name: Furfural
Other Names: 2-Formylfuran
Furaldehyde
2-Furaldehyde
2-Furfural

Hazards:

- Extremely irritating to skin, eyes, nose and lungs
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors mat travel long distances to ignition sources and flashback
- Reacts violently upon contact with acids

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Almond-like odor
- Sinks in water and is moderately soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed

CAS: 98-01-1

SOMAN

Other Names: 3,3-Dimethyl-2-butyl methylphosphonofluoridate
GD
Pinacolyl methylphosphonofluoridate
PMFP

WARNING! • POISON! BREATHING THE VAPOR, SKIN OR EYE CONTACT, OR SWALLOWING THE MATERIAL CAN KILL YOU!
• Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic phosphorous oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area of release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to yellow or brown liquid
- Faint camphor-like odor
- Reacts slowly with water to form less toxic materials and is soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Very volatile
- An organophosphate insecticide used as a war nerve gas

Operational Level Training Response:
RELEASE, NO FIRE:
- BACK OFF! - Isolate a wide area around the release and call for expert help
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Combustion products are less toxic than the material itself.
- If material is involved in a fire which must be extinguished, use an agent appropriate for the burning material using unattended equipment.

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, initial treatment includes atropine

CAS: 96-64-0

HEXANE

UN 1208

Shipping Name: Hexanes
Other Names: Gettysolve B
n-Hexane

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 110-54-3

GLYPHOSATE

Other Names: Muster
N-phosphonomethylglycine
Rodeo
Roundup

Hazards:
- Moderately irritating to eyes, nose and lungs
- Container may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic phosphoric acid and nitrogen oxides

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- Shipped and stored in solution containing at least 48% water
- No odor
- Floats on water and is slightly soluble in water
- Flammable
- An herbicide

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 1071-83-6

METHYL IODIDE

UN 2644

Shipping Name: Methyl iodide
Other Names: Halon 10001
Iodomethane

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Prolonged contact with eyes can cause burns
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen iodide

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid that turns brown upon exposure to light
- Sweet odor
- Sinks in water and slowly decomposes in water; is slightly soluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 108° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material or runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the material burning
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-88-4

HYDROGEN CHLORIDE

(ANHYDROUS)

UN 1050 (gas)

UN 2186 (refrigerated liquid)

Shipping Name: UN 1050 Hydrogen chloride, gas
UN 2186 Hydrogen chloride, refrigerated liquid

Other Names: HCl

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Reacts with water to produce heat and hydrochloric acid
- Corrosive to common metals especially in the presence of moisture to form flammable hydrogen gas
- Contact with liquid may cause frostbite

Description:
- Colorless gas
- Shipped and stored as a cryogenic liquid
- Sharp pungent odor
- Initally sinks in water and is soluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area around the release and deny
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

Perform Awareness Level Actions and:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting suddenly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS, if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7647-01-0

HEPTANES

UN 1206

Shipping Name: Heptanes
Other Names: n-Heptane

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

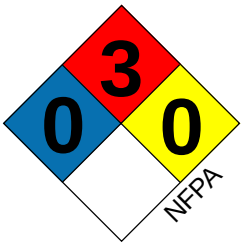
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 142-82-5



n-HEPTENE

UN 2278

Shipping Name: n-Heptene
Other Names: 1-Heptene
Heptylene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Mildly irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 592-76-7

METHYL BUTYL KETONE

UN 1224

Shipping Name: Ketones, n.o.s.
Other Names: 2-Hexanone
MBK
MNBK
Propylacetone

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Finger nail polish remover (acetone)-like odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 591-78-6

METHYL ISOBUTYL KETONE

UN 1245

Shipping Name: Methyl isobutyl ketone

Other Names:		
	Hexone	MIBK
	Isobutyl methyl ketone	MIK
	2-Methyl-4-pentanone	

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Mild pleasant odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-10-1

TRIS-(2-CHLOROETHYL) AMINE

Other Names: HN_3
Nitrogen mustard
2,2',2''-Trichlorotriethylamine
TS 160

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion products include toxic nitrogen oxides and hydrogen chloride

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Pale yellow liquid
- Faint fishy, or soap-like odor
- Slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 25° F
- Has been used as a blister-type war gas

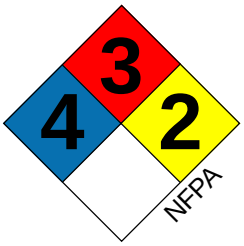
Operational Level Training Response:

RELEASE, NO FIRE:
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the vicitm remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 555-77-1



METHYLHYDRAZINE

UN 1244

Shipping Name: Methylhydrazine
Other Names: Hydrazomethane
1-Methylhydrazine
MMH
Monomethylhydrazine

WARNING!

- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR CONTACT WITH SKIN CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- HIGHLY FLAMMABLE! MAY IGNITE SPONTANEOUSLY UPON CONTACT WITH POROUS MATERIALS LIKE EARTH, WOOD OR CLOTH!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Material may burn in the absence of air
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- May interfere with the body's ability to use oxygen
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless fuming liquid
- Fishy ammonia-like odor
- Soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Used as rocket fuel

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 60-34-4

HYDROCHLORIC ACID

(SOLUTION GREATER THAN 25%)

UN 1789

Shipping Name: Hydrochloric acid, solution
Other Names: Hydrogen chloride solution
Muriatic acid

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Reacts with common metals to produce flammable hydrogen gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area around the release and deny
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to light yellow liquid
- Depending upon concentration may fume upon release
- Sharp pungent irritating odor
- Soluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

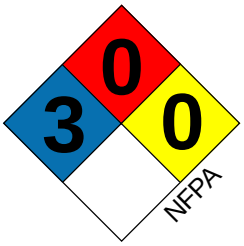
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7647-01-0



SODIUM CYANIDE

UN 1689

Shipping Name: Sodium cyanide
Other Names: Hydrocyanic acid, sodium salt

WARNING!
- POISON! BREATHING OR SWALLOWING THE DUST, OR SKIN CONTACT CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- CONTACT WITH CARBON DIOXIDE (CO_2) OR ACIDS WILL RELEASE CYANIDE GAS!

Hazards:
- Decomposition products upon heating include toxic cyanide and nitrogen oxides
- Corrosive to aluminum

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:
- Colorless solid
- Odorless or almond-like odor
- Dissolves in water
- Nonflammable

Operational Level Training Response:
RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- DO NOT USE CARBON DIOXIDE (CO_2) EXTINGUISHERS ON FIRE; releases toxic hydrogen cyanide gas
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 143-33-9

HYDROFLUORIC ACID

UN 1790

Shipping Name: Hydrofluoric acid, solution
Other Names: Hydrogen fluoride, solution

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE LIQUID OR SKIN CONTACT CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Container may BLEVE when exposed to fire
- Reacts with most metals to form flammable and explosive hydrogen gas
- Corrosive to most metals

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated run off enters waterway, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Shipped and stored as a 40% to 70% solution of hydrogen fluoride in water
- Irritating odor
- Soluble in water
- Nonflammable

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: skin burns can be treated with calcium gluconate gel

CAS: 7664-39-3

HYDROGEN

UN 1049 (Compressed gas)
UN 1966 (Cryogenic liquid)
Shipping Name: UN 2029 Hydrogen, compressed
UN 1966 Hydrogen, refrigerated liquid
(cryogenic liquid)

WARNING! ● EXTREMELY FLAMMABLE! BURNS WITH AN INVISIBLE FLAME EVEN IN THE DARK!
● CONTAINER MAY EXPLODE WHEN EXPOSED TO FIRE!

Hazards:
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- High pressure releases often ignite without any apparent source of ignition
- Exposure to the liquid may cause frostbite

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials

Description:
- Colorless compressed gas or cryogenic liquid
- No odor
- Insoluble in water
- Extremely flammable
- Gas is lighter than air

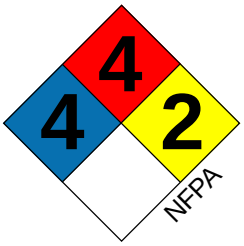
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1333-74-0



PHOSPHINE

UN 2199

Shipping Name: Phosphine
Other Names: Hydrogen phosphide
Phosphorous hydride
Phosphorous trihydride

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE! MAY IGNITE SPONTANEOUSLY UPON EXPOSURE TO AIR!

Hazards:

- Gas is heavier than air and will collect and stay in low areas
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Container may BLEVE or explode when exposed to fire
- Gas may travel long distances and flashback
- Gas may explode in closed spaces (e.g., tanks, sewers, buildings)
- Irritating to skin, eyes, nose and lungs
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- A colorless gas
- Garlic or fish-like odor
- Shipped and stored in cylinders as liquefied compressed gas
- Liquid floats and boils on the surface of water and is insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Toxic effects may be delayed
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7803-51-2

SULFURIC ACID

UN 1830 (More than 51%)

Shipping Name: Sulfuric acid

Other Names: Hydrogen sulfate
Oil of Vitrol

WARNING!

- POISON! BREATHING THE VAPORS OR SWALLOWING THE MATERIAL CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- REACTS VIOLENTLY WITH WATER!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Contact with most metals produces flammable and potentially explosive hydrogen gas
- Decomposition products upon heating include toxic sulfur oxides
- Reacts violently with many organic materials including wood and paper

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to dark brown thick liquid
- No odor unless heated, then has a choking odor
- Reacts violently with water producing sulfuric acid and is soluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 50° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

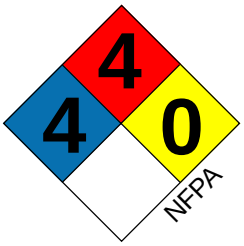
FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material; if possible, do not allow water to come in contact with the material. If material is involved in a fire, use dry chemical to extinguish; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 60 minutes and seek medical attention
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7664-93-9



HYDROGEN SULFIDE

UN 1053

Shipping Name: Hydrogen sulfide, liquefied
Other Names: Hydrosulfuric acid
Sewer gas
Sulfureted hydrogen
Sulfur hydride

WARNING!
- POISON! BREATHING THE GAS WILL KILL YOU!
- Fire fighting gear including SCBA does not provide adequate protection. If exposure to the chemical occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Containers may BLEVE or explode when exposed to fire
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers buildings) may explode when exposed to fire
- Contact with liquid can cause frostbite
- Combustion products include toxic sulfur oxides
- Will burn or explode in the presence of metal oxides

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For containers exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas that produces a visible cloud
- Shipped and stored as liquefied compressed gas
- Rotten egg odor
- Insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse gas - contain runoff

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
- Victims should be examined by a physician as soon as possible
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: if symptoms indicate, initial treatment includes amyl nitrite

CAS: 7783-06-4

HYDROXYLAMINE

Other Names: Oxammonium

WARNING! ● EXPLOSIVE! CONTAINER MAY EXPLODE WHEN EXPOSED TO FIRE OR HEATED ABOVE 265°F! MAY EXPLODE AT LOWER TEMPERATURES IF MATERIAL IS EXPOSED TO AIR!

Hazards:
- May interfere with the body's ability to use oxygen
- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Description:
- White solid
- No odor found
- Melts at 90° F forming a colorless liquid
- Initally sinks in water and is soluble in water
- Nonflammable

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the area of release or fire and deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Use extreme caution in approaching fire because material may explode without warning; no attempt should be made to fight fires except with unattended monitors using an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 7803-49-8

HYDROXYPROPYL METHACRYLATE

Other Names: 1,2-Propanediol-1-methacrylate
Propylene glycol monomethacrylate

Hazards:	**Description:**
● Container may BLEVE when exposed to fire ● Irritating to skin, eyes, nose and lungs ● Vapors are heavier than air and will collect and stay in low areas ● At elevated temperatures, may react with itself blocking relief valves leading to container explosion	● Colorless, clear liquid ● Pungent odor ● Sinks slowly in water and is slightly soluble in water ● Flammable ● Vapors are heavier than air and will collect and stay in low areas
Awareness and Operational Level Training Response: ● Stay upwind and uphill ● Determine the extent of the problem ● Isolate the area of release or fire and deny entry ● For container exposed to fire evacuate the area in all directions because of the risk of BLEVE ● Notify local health and fire officials and pollution control agencies ● If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water	**Operational Level Training Response:** RELEASE, NO FIRE: ● Stop the release if it can be done safely from a distance ● Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release ● Use large amounts of water to disperse vapors - contain runoff ● Consider the application of foam to large areas of spilled liquid to control vapors ● Ventilate confined area if it can be done without placing personnel at risk FIRE: ● Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material ● Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely ● If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 27813-02-1

IRON PENTACARBONYL

UN 1994

Shipping Name: Iron pentacarbonyl
Other Names: Iron carbonyl
Pentacarbonyliron

WARNING! ● HIGHLY FLAMMABLE! MAY IGNITE SPONTANEOUSLY IN AIR!

Hazards:

- Container may BLEVE when exposed to fire
- Severely irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic carbon monoxide

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:

- Yellow to dark red oily liquid
- No odor found
- Sinks in water and reacts slowly with water; insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -4° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

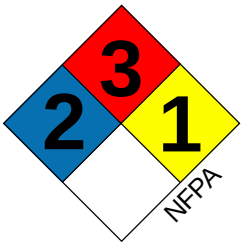
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns rinse with water and apply a clean dry dressing

CAS: 13463-40-6



MESITYL OXIDE

UN 1229

Shipping Name: Mesityl oxide

Other Names: Isobutenyl methyl ketone
Isopropylidene acetone
Methyl isobutenyl ketone
MIBK
4-Methyl-3-penten-2-one

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs; can cause burns to eyes
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless, oily liquid
- Spearmint or honey-like odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 141-79-7

METHYL ISOBUTYL CARBINOL

UN 2053

Shipping Name: Methyl isobutyl carbinol

Other Names: Isobutyl methyl carbinol, MAOH, MIBC, 3-MIC, Methyl amyl alcohol, 4-Methyl-2-pentanol

Hazards:
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Sharp, irritating odor
- Floats on the surface of water and is slightly soluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 108-11-2

ISOBUTYLENE

UN 1055

Shipping Name: Isobutylene
Other Names: 2-Methylpropene

WARNING! ● EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Exposure to the liquid may cause frostbite

Description:

- Colorless gas
- Mild odor similar to gasoline
- Liquid floats on the surface of water and boils; is insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid below 20° F

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

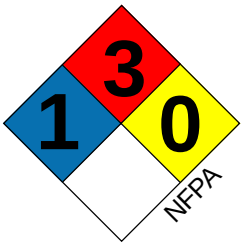
FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 115-11-7



4-METHYL-1-PENTENE

UN 2288

Shipping Name: Isohexenes
Other Names: Isobutylethene
Isohexene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

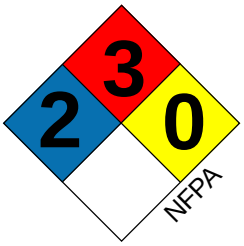
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 691-37-2



n-PROPYL BENZENE

UN 2364

Shipping Name: n-Propyl benzene
Other Names: Isocumene
1-Phenylpropane

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Light yellow to colorless liquid
- Petroleum-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 103-65-1

ETHYL ISOCYANATE

UN 2481

Shipping Name: Ethyl isocyanate
Other Names: Isocyanic acid, ethyl ester
Isocyanatoethane

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- A liquid
- No color or odor found
- Floats on the surface of water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 109-90-0

METHYL ISOCYANATE

UN 2480

Shipping Name: Methyl isocyanate
Other Names: Isocyanic acid, methyl ester
Methylcarbylamine
MIC

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER OR STEAM!

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Vapors are heavier than air and will collect and stay in low areas
- Highly flammable
- May react with itself without warning blocking relief valves leading to violent tank explosion
- Container may explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include hydrogen cyanide and nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sharp pungent odor
- Reacts violently with water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 104° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact or if venting sound suddenly increases and/or unexpectedly stops, withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 624-83-9

ISOPRENE

(INHIBITED)

UN 1218

Shipping Name: Isoprene, inhibited
Other Names: Isopentadiene
2-Methyl-1,3-butadiene
2-Methylbutadiene

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) or containers may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Mild petroleum-like odor
- Floats on the surface of water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Liquid boils at 93° F
- Produces large amounts of vapor

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound suddenly increases and/or unexpededly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 78-79-5

METHYL ISOPROPENYL KETONE

(INHIBITED)

UN 1246

Shipping Name: Methyl isopropenyl ketone, inhibited
Other Names: Isopropenyl methyl ketone
2-Methyl-1-butenone
3-Methyl-3-butene-2-one

Hazards:

- Highly flammable
- May react with itself without warning blocking relief valves leading to container explosion
- Extremely irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated run \off enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Pleasant odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, venting sound increases and/or unexpectedly stops, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 814-78-8

3-METHYL-2-BUTANONE

UN 2397

Shipping Name: 3-Methylbutan-2-one
Other Names: Isopropyl methyl ketone
3-Methylbutan-2-one
Methyl isopropyl ketone
MIPK

Hazards:

- Highly flammable
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet acetone-like odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 563-80-4

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Isopropyl nitrate	1222	Flammable	3	3	0	
Isopropyl percarbonate			0	2	2	OX
Isopropyl peroxydicarbonate	2133		**0**	**4**	**4**	**OX**
Isopropyl propionate	2409	Flammable	2	3	0	
Kepone			2	1	0	
Ketene			4	2	3	~~W~~
Lacquer	1263	Flammable	1	3	0	
Lacquer thinner	1263	Flammable	**1**	**3**	**0**	
Lactic acid			1	1	0	
Lasiocarpine			2	1	0	
Lauric acid			0	1	0	
Lauroyl peroxide	2124	Organic peroxide	0	2	0	
Lauroyl peroxide (<42%)	2893	Organic peroxide	0	2	0	
Lauryl mercaptan			**2**	**1**	**0**	
Lead			0	0	0	
Lead acetate	1616	Poison	1	0	0	
Lead arsenate	1617	Poison	2	0	0	
Lead azide (wetted with >20% water)	0129	1.1A Explosive	**3**	**0**	**3**	
Lead chloride	2291	Poison	1	0	0	
Lead fluoride	2811	Poison	1	0	0	
Lead fluoroborate	2291	Poison	1	0	0	
Lead iodide			1	0	0	
Lead nitrate	1469	Oxidizer	1	0	0	OX
Lead phosphate			0	0	0	
Lead stearate			1	0	0	
Lead sulfate	1794	Corrosive	0	0	0	
Lead sulfide			1	0	0	
Lead tetraacetate			2	0	0	
Lead thiocyanate			1	0	0	
Lead thiosulfate			1	0	0	
Lead tungstate			1	0	0	
Leptophos			3	1	0	
Lindane	2761	Poison	3	0	0	
Linseed oil, boiled			2	2	0	
Linseed oil, raw			**0**	**1**	**0**	
Litharge			0	0	0	
Lithium aluminum hydride	1410	Dangerous when wet	**3**	**2**	**2**	**~~W~~**

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

METHYL ISOTHIOCYANATE

UN 2477

Shipping Name: Methyl isothiocyanate

Other Names: MITC; Vorlex; Methyl mustard; MIT; Isothiocyanic acid, methyl ester

WARNING!
- POISON! BREATHING THE VAPOR OR DUST OR SWALLOWING THE DUST CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Severely irritating to skin, eyes, nose and lungs; skin and eye contact can cause severe burns
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic cyanides and sulfur oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless solid
- Horseradish-like odor
- Sinks in water and is sightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Melts at 95° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning material. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 556-61-6

THIOUREA

NA 1325

Shipping Name: Medicines, flammable, solid, n.o.s.
Other Names: Isothiourea
Thiocarbamide
2-Thiourea

Hazards:
- Harmful or fatal if swallowed
- Irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire
- Combustion or decomposition products upon heating include toxic nitrogen and sulfur oxides

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- White solid
- No odor found
- Sinks in water and is moderately soluble in water
- Flammable

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 62-56-6

POTASSIUM

UN 2257

Shipping Name: Potassium
Other Names: K

WARNING!
- DO NOT USE WATER! REACTS VIOLENTLY TO FORM HIGHLY FLAMMABLE AND EXPLOSIVE HYDROGEN GAS!
- MAY IGNITE SPONTANEOUSLY IN AIR!
- DO NOT USE CARBON DIOXIDE OR HALOGENATED EXTINGUISHING AGENTS - FORMS EXPLOSIVE MIXTURES!

Hazards:

- Skin and eye contact causes severe burns and blindness
- Highly flammable
- Fumes from burning material are extremely irritating to skin, eyes, nose and lungs
- Container may explode when exposed to fire

Description:

- Silvery-white soft solid
- No odor
- Shipped and stored under oil or nitrogen
- Reacts violently with water producing highly flammable and explosive hydrogen gas
- Highly flammable

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterway notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- DO NOT USE WATER DIRECTLY ON MATERIAL - reacts violently with water to form highly flammable hydrogen gas
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- APPROACH FIRE WITH EXTREME CAUTION; consider letting fire burn
- Do not allow water to come in contact with the material; if material is on fire use Class D extinguisher, graphite, soda ash or inert powder to extinguish
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7440-09-7

LITHIUM

UN 1415

Shipping Name: Lithium
Other Names: Li
Lithium metal

WARNING! ● DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM FLAMMABLE HYDROGEN GAS AND A CAUSTIC SOLUTION!
● METAL POWDER OR SHAVINGS MAY IGNITE SPONTANEOUSLY IN AIR!

Hazards:
- Skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Fumes from burning metal are highly irritating to skin, eyes, nose and lungs

Description:
- Silvery white solid - turns yellow upon exposure to moisture
- No odor
- Shipped and stored under inert gas, mineral oil or kerosene
- Floats on the surface of water and reacts with water to form highly flammable hydrogen gas and a caustic solution
- Very flammable

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

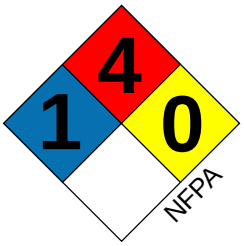
Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- DO NOT allow water to come in contact with the material; if material is on fire, use Class D extinguisher to extinguish
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7439-93-2



LIQUEFIED NATURAL GAS

(LNG)

UN 1972

Shipping Name: Liquefied natural gas
Other Names: LNG
Natural gas

WARNING!
- EXTREMELY FLAMMABLE!
- CYLINDERS EXPOSURED TO FIRE OR FLAME MAY RUPTURE AND ROCKET THROUGH BUILDING!

Hazards:
- Gas may travel long distances to ignition sources and flashback
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Gas is lighter than air but will collect and stay in low areas
- Contact with liquid may cause frostbite

Description:
- Colorless gas
- No odor or with weak skunk-like odor
- Shipped and stored as a compressed gas or cryogenic liquid
- Liquid floats and boils on the surface of water; is insoluble in water
- Extremely flammable
- Gas is lighter than air but will collect and stay in low areas

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

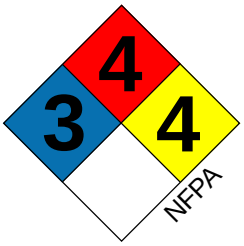
FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 74-82-8

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Lithium bichromate			1	0	1	OX
Lithium borohydride	1413	Dangerous when wet	3	4	3	W
Lithium chromate			1	0	1	OX
Lithium hydride	1414	Dangerous when wet	3	2	2	W
Magnesium (powder)	1418	Dangerous when wet	0	1	1	
Magnesium perchlorate	1475	Oxidizer	1	0	0	OX
Magnesium phosphide	2011	Dangerous when wet	4	3	2	W
Malathion	2783	Poison	2	1	0	
Maleic acid	2215	Corrosive	1	1	0	
Maleic anhydride	2215	Corrosive	3	1	1	
Maleic hydrazide			1	1	0	
Maneb	2968	Spontaneously combustible	0	4	0	
Manganese (dust)			0	2	2	
Melamine			0	2	0	
Mephosfolan			4	1	0	
Mercaptodimethur	2784	Flammable	3	1	0	
Mercuric acetate	1629	Poison	2	0	0	
Mercuric ammonium chloride	1630	Poison	3	0	0	
Mercuric chloride	1624	Poison	3	0	0	
Mercuric cyanide	1636	Poison	3	0	0	
Mercuric iodide	1638	Poison	3	0	0	
Mercuric nitrate	1625	Poison	3	0	0	OX
Mercuric oxide	1641	Poison	3	0	0	
Mercuric sulfate	1645	Poison	3	0	0	
Mercuric sulfide			3	0	0	
Mercuric thiocyanate	1646	Poison	3	1	0	
Mercurous acetate	1629	Poison	3	0	0	
Mercurous chloride			2	0	0	
Mercurous nitrate	1627	Poison	1	0	0	OX
Mercury	2809	Corrosive	1	0	0	
Mercury fulminate (wetted >20% water)	0135	1.1A Explosive	3	0	3	
Mercury oxide	1641	Poison	3	0	0	
Mestranol			2	1	0	
Metaldehyde	1332	Flammable solid	1	3	1	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



PICRIC ACID

UN 0154 (dry or wetted with less than 30% water)
NA 1344 (wetted with greater than 10% water)

Shipping Name: UN 0154 Picric acid, dry or or wetted with less than 30% water
NA 1344 Picric acid, wet with not less than 10% water

Other Names: Melinite, Picral, Phenol trinitrate, Trinitrophenol

WARNING!
- EXPLOSIVE! DRY MATERIAL WILL EXPLODE UPON CONTACT WITH HEAT, FLAMES OR IF SHOCKED!
- EXTREMELY FLAMMABLE!

Hazards:

- Very irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Vapors are heavier than air and will collect and stay in low areas
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors in confined areas (e.g., tanks, sewers ,buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides
- Corrosive to metals

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Yellow solid
- No odor
- Sinks in water and is slightly soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Wet material with water or foam from a safe distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

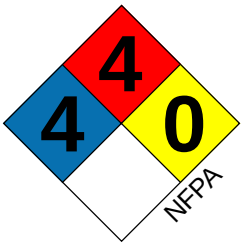
FIRE:

- Approach fire with extreme caution; consider letting fire burn
- Use water or foam to extinguish fire
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 88-89-1



METHYL MERCAPTAN

UN 1064

Other Names: Mercaptomethane
Methanethiol
Methyl sulfhydrate
Thiomethyl alcohol

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE!

Hazards:
- Gas is heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- May interfere with the body's ability to use oxygen
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless gas
- Shipped and stored as a liquefied gas under its own vapor pressure
- Rotten cabbage-like very disagreeable odor
- Slightly soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid below 43° F

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse gas - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 74-93-1

METHACRYLOYL CHLORIDE

Other Names: Methacrylic acid chloride
Methylacryl chloride

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion and decomposition products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shleter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- A liquid
- Pungent, irritating odor
- Sinks slowly in water and is insoluble in water
- Reacts with water to form toxic hydrogen chloride
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 920-46-7

METHYL PHOSPHONIC DICHLORIDE

NA 9206

Shipping Name: Methyl phosphonic dichloride
Other Names: Methanephosphonyl chloride

WARNING! • DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO PRODUCE TOXIC HYDROGEN CHLORIDE VAPOR!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent irritating odor
- Sinks in water and reacts violently with water to form toxic hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- DO NOT USE WATER DIRECTLY ON PRODUCT; reacts violently with to form toxic hydrochloric acid
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- DO NOT allow water to come in contact with the material; if material is on fire, use dry chemical to extinguish; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 676-97-1

METHYL tert-BUTYL ETHER

UN 2398

Shipping Name: Methyl tert-butyl ether
Other Names: t-Butyl methyl ether
2-Methoxy-2-methylpropane
MTBE

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Sharp, turpentine-like odor
- Floats on the surface of water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

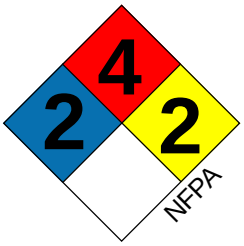
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1634-04-4



VINYL METHYL ETHER

(INHIBITED)

UN 1087

Shipping Name: Vinyl methyl ether, inhibited
Other Names: 1-Methoxyethylene
Methoxyethylene
Methyl vinyl ether

WARNING! • EXTREMELY FLAMMABLE! CONTAINER MAY EXPLODE WHEN EXPOSED TO FIRE!
• MAY REACT WITH ITSELF BLOCKING RELIEF VALVES AND LEADING TO TANK EXPLOSION!

Hazards:

- Gas is heavier than air and will collect and stay in low aeas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless gas
- Sweet odor
- Liquid floats on the surface of water and is slightly soluble in water
- Extremely flammable
- Shipped and stored as a compressed gas
- Gas is heavier than air and will collect and stay in low areas
- A liquid below 42° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-25-5

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Methylene diisocyanate			1	2	1	~~W~~
Methylethylamine			3	3	0	
2-Methyl-6-ethyl aniline			1	1	0	
3-(1-Methyl ethyl) phenyl methyl carbamate			2	1	0	
Methyl ethyl pyridine	2300	Poison	**3**	**2**	**0**	
Methyl fluoroacetate			4	3	0	
Methyl fluorosulfate			4	1	0	
Methyl formal	1234	Flammable	2	3	2	
Methyl heptyl ketone			**0**	**2**	**0**	
2-Methyl-2-hydroxy-3-butyne			2	3	0	
Methyl mercaptopropionaldehyde			**2**	**2**	**0**	
Methyl mercuric dicyanamide			3	1	0	
Methyl mercury			3	1	0	
Methyl methane sulfonate			2	2	0	
1-Methyl naphthalene			2	2	0	
Methyl nitrite	2455	Forbidden	3	4	0	
2-Methyl-1-nitroanthraquinone			2	1	0	
3-Methyl nitrosoaminopropionitrile			3	2	0	
Methyl orthosilicate	2606	Flammable	0	2	0	
Methylpentane	2462	Flammable	**1**	**3**	**0**	
2-Methyl-1-pentene			**1**	**3**	**0**	
2-Methyl-2-pentene			**1**	**3**	**0**	
4-Methyl-2-pentene			**1**	**3**	**0**	
Methyl phenkapton			3	1	0	
Methyl phosphonous dichloride	2845	Poison	4	4	3	~~W~~
Methylphosphonyl dichloride			**3**			
Methylpiperidine	2399	Flammable	2	3	2	
Methyl propionate	1248	Flammable	**1**	**3**	**0**	
Methyl propyl ether	2612	Flammable	**0**	**3**	**0**	
Methyl propyl ketone	1249	Flammable	**2**	**3**	**0**	
1-Methyl pyrrolidone			**2**	**1**	**0**	
Methyl salicylate			**1**	**1**	**0**	
Methyltetrahydrofuran	2536	Flammable	**2**	**3**	**0**	
Methyl trichloroacetate	2533	Flammable	2	1	0	
2-Methyl-5-vinyl pyridine (MVP)	3073	Poison	2	2	0	
Metolachlor			1	0	0	
Metolcarb			3	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

METHYL PHOSPHONOTHIOIC DICHLORIDE

UN 1760

Shipping Name: Methyl phosphonothioic dichloride, anhydrous
Other Names: Methyl phosphorous dichloride
MPTD

WARNING! ● DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO PRODUCE HYDROGEN CHLORIDE VAPOR!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; prolonged contact with the skin will cause burns
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride and sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear liquid
- Sharp, acrid irritating smell
- Sinks in water and reacts with water producing hydrogen chloride vapor and hydrochloric acid
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -14° F

Operational Level Training Response:

RELEASE, NO FIRE:

- DO NOT USE WATER DIRECTLY ON PRODUCT; reacts with water to form toxic hydrochloric acid
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- DO NOT ALLOW WATER TO COME IN CONTACT WITH MATERIAL; if material is on fire, use dry chemical to extinguish; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 676-98-2

METHYL THIOCYANATE

Other Names: Methyl rhodanate
Methyl sulfocyanate
Thiocyanomethane

WARNING! ● POISON! BREATHING THE VAPOR, SWALLOWING THE MATERIAL OR SKIN CONTACT WITH LIQUID CAN KILL YOU! CONVERTED TO CYANIDE IN THE BODY!
● Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposition products upon heating include toxic nitrogen and sulfur oxides and hydrogen cyanide

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate a wide area around the release and deny entry
- For container exposed to fire, evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Onion-like odor
- Sinks in water and is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material or runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn, fight surrounding fire with an agent appropriate for the material burning
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can produce cyanide toxicity; if symptoms indicate, initial treatment includes the cyanide antidote kit

CAS: 556-64-9

VINYL TOLUENE

(INHIBITED)

UN 2618

Shipping Name: Vinyl toluene inhibited

Other Names: Methyl styrene

WARNING! ● WHEN HEATED, MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:

- Irritating to skin, eyes, nose and lungs
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback

Description:

- Colorless liquid
- Strong, disagreeable odor
- Floats on the surface of water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 25013-15-4

PROPYLENEIMINE

(INHIBITED)

UN 1921

Shipping Name: Propyleneimine, inhibited
Other Names: Methylaziridine

WARNING! • MAY REACT WITH ITSELF BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:

- Extremely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless oily liquid that fumes upon contact with air
- Strong ammonia-like smell
- Initially floats on the surface of water and is soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-55-8

TOLUENE

UN 1294

Shipping Name: Toluene
Other Names: Methylbenzene
Methylbenzol
Phenylmethane
Toluol
Tolu-sol

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flash back
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pleasant odor like model glue
- Floats on water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

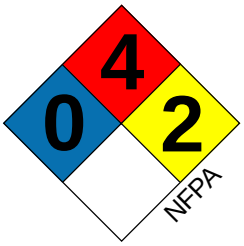
RELEASE, NO FIRE:

- Stop the release if it can be done safely
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk
- FIRE:
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-88-3



1,3-PENTADIENE

UN 3295

Shipping Name: Hydrocarbons, liquid, n.o.s.
Other Names: 1-Methylbutadiene
Piperylene

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Description:

- Colorless liquid
- Floats on the surface of water and is slightly soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 108° F
- Produces large amounts of vapor

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 504-60-9

METHYLCYCLOPENTANE

UN 2298

Shipping Name: Methylcyclopentane
Other Names: Methylpentamethylene

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For containers exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

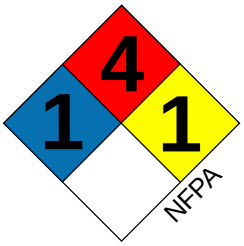
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 96-37-7



PROPYLENE

UN 1077

Shipping Name: Propylene
Other Names: Methylene, Methylethylene, 1-Propene, Propene, 1-Propylene

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE or explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless gas
- Faint petroleum-like odor
- Floats on water and boils on water and is insoluble in water
- Shipped and stored as a liquefied compressed gas
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- Frostbite - warm injured area in very warm water

CAS: 115-07-1

VX

Other Names: s-(2-Bis(1-methylethyl)amino)ethyl) o-ethylester
Methylphosphonothioic acid
TX 60

WARNING! • POISON! BREATHING THE VAPOR, SKIN OR EYE CONTACT, OR SWALLOWING THE MATERIAL CAN KILL YOU!
• Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area of release or fire, deny entry and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to yellow liquid
- No odor
- Sinks in water and is slightly soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- An organophosphate insecticide used as a war nerve gas

Operational Level Training Response:

RELEASE, NO FIRE:
- BACK OFF! - Isolate a wide area around the release and call for expert help
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Combustion products are less toxic than the material itself.
- If material is involved in a fire which must be extinguished, use an agent appropriate for the burning material, using unattended equipment.

First Aid:
- DO NOT ATTEMPT RESCUE!
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, initial treatment includes atropine

CAS: 50782-69-9

METHYLTRICHLORO SILANE

UN 1250

Shipping Name: Methyltrichlorosilane
Other Names: Trichloromethylsilane
Trichloromethylsilicon

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU ! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM HYDROCHLORIC ACID!

Hazards:
- Highly flammable
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

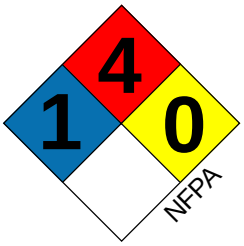
Description:
- Colorless fuming liquid
- Sharp acrid odor
- Reacts violently with water to form hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:
RELEASE, NO FIRE:
- Stop release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH
- Material reacts with water but can be extinguished with low or medium expansion AFFF foam or dry chemical if available in sufficient amounts
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Skin and eye contact causes severe burns and blindness

CAS: 75-79-6



NAPHTHA

UN 1255
UN 1256
UN 1268
UN 2553

Shipping Name: Petroleum distillate, n.o.s.

Other Names: Benzin; Mineral spirits; Petroleum; Stoddard solvent; Petroleum ether; Petroleum naphtha; Petroleum solvent

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Description:

- Colorless to light yellow liquid
- Gasoline-like odor
- Floats on water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils between 95° F and 140° F

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 8030-30-6

NITROBENZENE

UN 1662

Shipping Name: Nitrobenzene

Other Names: Benzene nitro, Mirbane oil, Nitrobenzol, o-Nitrobenzene, p-Nitrobenzene, Oil of bitter almonds

WARNING!
- POISON! BREATHING THE VAPOR, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides
- Attacks some rubbers, plastics and coatings
- May interfere with the body's ability to use oxygen

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow to brownish oily liquid
- Odor like almonds or bitter almonds (some may not be able to smell it)
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 98-95-3

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Nickel subsulfide			2	0	0	
Nickel sulfate			2	0	0	
Nicotine	1654	Poison	**4**	**1**	**0**	
Nicotine sulfate	1658	Poison	4	1	0	
Nitralin			1	1	1	
Nitrilotriacetic acid			1	1	0	
Nitrilotriacetic acid, disodium salt			1	1	0	
Nitrilotriacetic acid, sodium salt			1	1	0	
Nitrilotriacetic acid, trisodium salt			1	1	0	
5-Nitroacenaphthene			1	1	0	
4-Nitroaniline	1661	Poison	**3**	**1**	**2**	
5-Nitro-o-anisidine			2	1	0	
4-Nitrobiphenyl			**2**	**1**	**0**	
Nitrocellulose (with plasticizer >18%)	0343	Explosive 1.3C	**2**	**3**	**3**	
Nitrocellulose (with >25% water)	2555	Flammable solid	**2**	**3**	**3**	
Nitrocresols	2446	Keep away from food	1	1	0	
Nitrocyclohexane			**2**	**2**	**3**	
Nitroethane	2842	Flammable	**1**	**3**	**3**	
Nitrofen			2	2	0	
Nitrogen mustard hydrochloride			3	2	0	
Nitrogen mustard N-oxide			2	2	0	
Nitrogen mustard N-oxide hydrochloride			2	2	0	
Nitrogen trifluoride	2451	Nonflammable gas	3	0	3	OX
m-Nitrophenol	1663	Poison	**3**	**1**	**2**	
o-Nitrophenol	1663	Poison	**3**	**1**	**2**	
p-Nitrophenol	1663	Poison	**3**	**1**	**2**	
2-Nitrophenol	1663	Poison	**3**	**1**	**2**	
3-Nitrophenol	1663	Poison	**3**	**1**	**2**	
4-Nitrophenol	1663	Poison	**3**	**1**	**2**	
N-methyl-2,2'-di(chloroethyl) amine			4	1	0	
4-Nitropyridine-1-oxide			2	2	0	
N-nitrosodiethanolamine			0	1	0	
N-nitrosodiethylamine			2	1	0	
N-nitrosodimethylamine			2	1	1	
N-nitrosodi-n-butylamine			1	1	0	
N-nitrosodi-n-propylamine			2	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

NITROTOLUENES

UN 1664

Shipping Name: Nitrotoluenes, liquid or solid

Other Names: 2-Nitrotoluene, o-Nitrotoluene, 3-Nitrotoluene, p-Nitrotoluene, 4-Nitrotoluene, 3-Nitrotoluol, m-Nitrotoluene

Hazards:

- May interfere with the body's ability to use oxygen
- Vapors are heavier than air and will collect and stay in low areas
- Irritating to skin, eyes, nose and lungs
- Container may BLEVE or explode when exposed to fire
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Yellow liquid
- Weak, aromatic odor
- Sinks in water and is insoluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 60° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 99-08-1(m, meta-); 99-99-0 (p, para-); 88-72-2 (o, ortho-)

SARIN

Other Names: Mous-con
Phosvin
Ratal
ZP

WARNING! • POISON! BREATHING THE VAPOR, SKIN AND EYE CONTACT CAN KILL YOU!
• Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of vapor
- Container may BLEVE or explode when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion products include toxic phosphorous oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- BACK OFF! - Isolate the area of release or fire, deny entry and call for expert help
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- A colorless liquid
- No odor
- Sinks in water and is insoluble in water
- Flammable
- Very volatile
- Vapors are heavier than air and will collect and stay in low areas
- An organophosphate insecticide used as a war nerve agent

Operational Level Training Response:

RELEASE, NO FIRE:

- BACK OFF! - Isolate a wide area around the release and call for expert help
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- If material is involved in a fire and conditions permit, DO NOT EXTINGUISH. Combustion products are less toxic than the material itself.
- If material is involved in a fire which must be extinguished, use an agent appropriate for the burning material using unattended equipment

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- The contaminated victim poses a health risk to the responder
- Decontaminate the victim from a safe distance with a stream of water; have the victim remove clothing if possible; provide Basic Life Support/CPR as needed
- Further decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Do NOT perform direct mouth to mouth resuscitation; use a bag/mask apparatus
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- Note to physician: an organophosphate insecticide; if symptoms indicate, initial treatment includes atropine

CAS: 107-44-8

ZINC PHOSPHIDE

UN 1714

Shipping Name: Zinc phosphide
Other Names: Mous-con
Phosvin
Ratal
ZP

WARNING! ● DO NOT USE WATER, CARBON DIOXIDE (CO_2) OR HALOGENATED FIRE FIGHTING AGENTS! HIGHLY TOXIC AND FLAMMABLE PHOSPHINE RELEASED!

Hazards:

- Highly flammable
- Harmful or fatal if swallowed
- Container may explode when exposed to fire
- Reacts with acids and water to produce highly toxic and flammable phosphine gas
- Decomposition products upon heating include toxic phosphorous oxides

Awareness and Operational Level Training Response:

- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Gray solid
- Faint garlic-like odor
- Sinks in water and reacts with water releasing highly toxic and flammable phosphine gas; is insoluble in water
- Highly flammable

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:

- If material is on fire and conditions permit, DO NOT EXTINGUISH.
- Do not allow water to come in contact with the material; if material is on fire, use Class D extinguisher to extinguish
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 1314-84-7

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Potassium dichloro-s-triazinetrione	2465	Oxidizer	3	0	2	OX
Potassium dichromate	1479	Oxidizer	2	0	2	OX
Potassium fluoride	1812	Poison	3	0	0	
Potassium hydroxide	1813	Corrosive	3	0	1	
Potassium hydroxide solution	1814	Corrosive	3	0	1	
Potassium iodide			1	0	0	
Potassium oxalate			1	0	0	
Potassium permanganate	1490	Oxidizer	1	0	1	OX
Potassium peroxide	1491	Oxidizer	3	0	1	OX
Potassium silver cyanide			3	0	0	
Progesterone			0	1	0	
Promecarb			3	1	0	
Prometryne			1	1	0	
Propadiene	2200	Flammable gas	2	4	3	
Propane sultone			2	1	0	
N- propanolamine			3	2	0	
Propargite			2	3	0	
Propellant 12	1028	Nonflammable gas	1	0	0	
Propionaldehyde	1275	Flammable	3	2	1	
Propionic anhydride	2496	Corrosive	3	2	1	
Propoxur			2	1	0	
Propylamine	1277	Flammable	3	3	0	
Propylene butylene polymer			0	2	0	
1,2-Propylenediamine	2258	Corrosive	2	3	0	
Propylene glycol			0	1	0	
Propylene glycol ethyl ether			0	2	0	
Propylene glycol methyl ether			0	3	0	
Propylene tetramer	2850	Flammable	0	1	0	
Propylene trimer	2057	Flammable	0	3	0	
n-Propyl nitrate	1865	Flammable	2	3	3	OX
Prothoate	2783	Poison	4	1	0	
Pyrene			1	2	0	
Pyrethrins	9184		2	1	0	
Pyriminil			3	1	0	
Pyrogallic acid			2	1	0	
Pyrosulfuryl chloride	1817	Corrosive	3	1	2	OX, ₩

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

N-(2-METHYLPHENYL)-THIOUREA

Other Names: o-Tolyl thiourea
1-(2-Tolyl)thiourea

Hazards:
- Irritating to skin, eyes, nose and lungs
- Combustion and decomposition products upon heating include toxic nitrogen and sulfur oxides

Description:
- Colorless solid
- No odor
- Soluble in water
- Flammable

Awareness and Operational Level Training Response:
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 614-78-8

SODIUM

UN 1428

Shipping Name: Sodium
Other Names: Naturium

WARNING!
- DO NOT USE WATER! REACTS VIOLENTLY TO FORM HIGHLY FLAMMABLE AND EXPLOSIVE HYDROGEN GAS!
- HIGHLY FLAMMABLE! WHEN HEATED IGNITES SPONTANEOUSLY IN AIR!
- MAY REACT VIOLENTLY WITH CARBON DIOXIDE OR HALOGENATED EXTINGUISHING AGENTS!

Hazards:

- Skin and eye contact causes severe burns and blindness
- Fumes from burning material are extremely irritating to skin, eyes nose and lungs
- Container may explode when exposed to fire

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Silvery-white solid
- Shipped or stored under an inert gas or mineral oil
- No odor
- Floats on the surface of water and reacts violently with water producing flammable and explosive hydrogen gas
- Highly flammable

Operational Level Training Response:

RELEASE, NO FIRE:

- DO NOT USE WATER DIRECTLY ON MATERIAL - reacts with water to form highly flammable hydrogen gas
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release

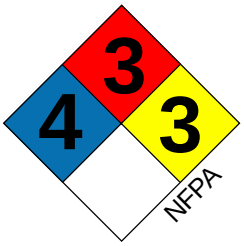
FIRE:

- APPROACH FIRE WITH EXTREME CAUTION; consider letting fire burn
- Do not allow water to come in contact with the material; if material is on fire, use graphite, Class D extinguisher, soda ash or inert powder to extinguish
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7440-23-5



NICKEL CARBONYL

UN 1259

Shipping Name: Nickel carbonyl
Other Names: Nickel tetracarbonyl
Tetracarbonyl nickel

WARNING!
- POISON! BREATHING THE VAPOR OR SWALLOWING THE MATERIAL CAN KILL YOU! RELEASES CARBON MONOXIDE IN THE BODY!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXPLOSIVE! MATERIAL MAY EXPLODE WHEN MIXED WITH AIR AT TEMPERATURES AS LOW AS 68°F EVEN WITHOUT AN IGNITION SOURCE!

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Musty or sooty odor
- Sinks in water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -2° F and boils at 109° F
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liqud to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Approach fire with extreme caution; consider letting burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: converted to carbon monoxide in the body; if symptoms indicate, initial treatment includes 100% oxygen

CAS: 13463-39-3

NITRIC OXIDE

UN 1660

UN 1975 (Mixture with Dinitrogen Tetroxide)

Shipping Name: UN 1660 Nitric oxide
UN 1975 Nitric oxide and dinitrogen tetroxide mixtures or Nitric oxide and nitrogen dioxide mixture

Other Names: Nitrogen monoxide Nitrogen oxide NO

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACTCAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Gas is heavier than air and will collect and stay in low areas
- Container may explode or BLEVE when exposed to heat or fire
- Reacts with steam or water to produce corrosive nitric acid and nitrous acid
- Contact with liquid may cause frostbite
- May interfere with the body's ability to use oxygen

Description:
- Colorless gas
- Shipped and stored as liquefied compressed gas
- Sharp unpleasant odor
- Moderately soluble in water
- Reacts with water to produce corrosive nitric acid and nitrous acid
- Nonflammable but may cause combustibles to ignite
- Gas is heavier than air and will collect and stay in low areas
- A liquid below 43°F

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 10102-43-9

NITROMETHANE

UN 1261

Shipping Name: Nitromethane
Other Names: Nitrocarbol

WARNING! ● EXPLOSIVE! MAY EXPLODE WHEN HEATED ABOVE 446°F OR SHOCKED!

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay uphill and upwind
- Determine the extent of the problem
- Isolate a wide area around the release and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear colorless oily liquid
- Disagreeable odor
- Sinks in water and is moderately soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam only to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

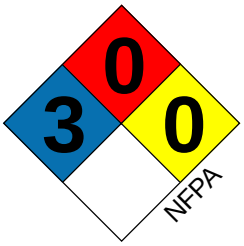
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - ♦ Inhalation - remove the victim to fresh air and give oxygen if available
  - ♦ Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - ♦ Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - ♦ Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-52-5



NITROGEN

UN 1066 (Compressed gas)
UN 1977 (Refrigerated liquid, Cryogenic Liquid)

Shipping Name: UN 1066 Nitrogen, compressed
UN 1977 Nitrogen, refrigerated liquid (cryogenic liquid)
Other Names: Nitrogen gas
Nitrogen liquid

Hazards:

- Odor is not a reliable indicator of the presence of toxic amounts of gas
- Cold vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Contact with liquid may cause frostbite

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Notify local health and fire officials

Description:

- Colorless gas or faint yellow liquid
- Shipped and stored as a compressed gas or cryogenic liquid
- No odor
- Liquid floats on the surface of water and boils; gas is insoluble in water
- Nonflammable
- Cold vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed noncryogenic containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location
- DO NOT APPLY WATER TO CRYOGENIC LIQUID CONTAINERS; if cryogenic liquid containers are exposed to direct flame or elevated temperatures for prolonged times, withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed

CAS: 7727-37-9

NITROSYL CHLORIDE

UN 1069

Shipping Name: Nitrosyl chloride
Other Names: Nitrogen chloride oxide
Nitrogen oxychloride

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:

- Gas is heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- May interfere with the body's ability to use oxygen
- Decomposition products upon heating include toxic hydrogen chloride and nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Yellow to reddish gas
- Choking odor
- Reacts with water to form toxic hydrochloric acid and is soluble in water
- Nonflammable but may cause combustibles to burn
- Gas is heavier than air and will collect and stay in low areas
- Becomes a liquid at 24° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

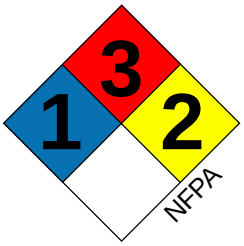
FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material; do not allow water to come in contact with the material, if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 2696-92-6



NITROPROPANE

UN 2608

Shipping Name: Nitropropanes
Other Names: 1-Nitropropane
2-Nitropropane

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Container may BLEVE when exposed to fire
- When heated, material may decompose with explosive violence
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Mild, fruity odor
- Floats on the surface of water and is slightly soluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 108-03-2 (1-Nitropropane); 79-46-9 (2-Nitropropane)

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
N-nitrosodiphenylamine			1	2	0	
N-nitrosomethylethylamine			2	1	0	
N-nitrosomethylvinylamine			3	1	0	
N-nitrosomorpholine			2	1	0	
N-nitroso-N-ethyl urea			2	1	0	
N-nitroso-N-methyl urea			2	1	0	
N-nitroso-N-methyl urethane			2	1	0	
N-nitrosonornicotine			2	1	0	
N-nitrosopiperidine			2	1	0	
N-nitrosopyrrolidine			2	1	0	
N-nitrososarcosine			0	1	0	
Nitrostarch (dry or wetted with <20% water)	0146	Explosive 1.1D	2	3	4	
Nitrostarch (wetted with >20% water)	1337	Flammable solid	2	3	2	
Nitrosylsulfuric acid	2308	Corrosive	3	0	2	OX
2-Nitrotoluene	1664	Poison	**3**	**1**	**1**	
4-Nitrotoluene	1664	Poison	**3**	**1**	**1**	
Nonane	1920	Flammable	**0**	**3**	**0**	
Nonanol			**1**	**2**	**0**	
Nonene	2057	Flammable	**0**	**3**	**0**	
Nonylphenol			**2**	**1**	**0**	
Norbormide			0	1	0	
Norethisterone			0	1	0	
Octachloronaphthalene			3	0	0	
Octamethyl diphosphoramide			3	1	0	
Octanoic acid			1	1	0	
Octanol			1	2	0	
Octyl epoxy tallate			0	2	0	
tert-Octyl mercaptan	3023	Poison	**2**	**2**	**0**	
Oleic acid			**0**	**1**	**0**	
Oleic acid, potassium salt			0	1	0	
Oleic acid, sodium salt			0	1	0	
Orange oil SS			0	1	0	
Ordram(or Molinate)			2	1	0	
Osmium tetroxide	2471	Poison	2	0	0	OX
Oxalic acid			**3**	**1**	**0**	
Oxamyl			4	1	0	
Oxydisulfoton			4	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

TRIETHYLENETETRAMINE

UN 2259

Shipping Name: Triethylenetetramine
Other Names: N-N'-bis(2-aminoethyl)-1,2-ethanediamine
TETA
Trien

Hazards:

- Severely irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Combustion or decomposition products upon heating include toxic nitrogen oxides

Description:

- Straw colored to amber colored oily liquid
- Ammonia-like odor
- Soluble in water
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 52° F

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

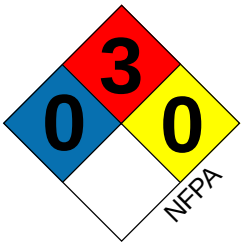
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid or dilute to a nonflammable mixture. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 112-24-3



OCTANE

UN 1262

Shipping Name: Octanes
Other Names: n-Octane

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Clear, colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

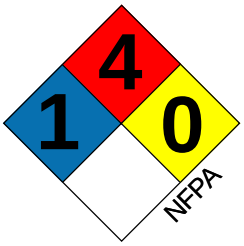
FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 111-65-9



PENTANE

UN 1265

Shipping Name: Pentanes
Other Names: n-Pentane
Skellysolve A

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE when exposed to heat or fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Description:

- Colorless liquid
- Gasoline-like odor
- Floats on the surface of water and is insoluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor
- Boils at 97° F

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-66-0

PHENYLTHIOUREA

UN 2767

Shipping name: Phenyl urea, pesticides, solid, toxic
Other Names: N-phenylthiourea
Phenylthiocarbamide
1-Phenyl-2-thiourea
PTU

WARNING! ● POISON! SWALLOWING OR BREATHING THE POWDER CAN KILL YOU!
● Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:
- Irritating to skin, eyes, nose and lungs
- Combustion or decomposition products upon heating include toxic nitrogen and sulfur oxides
- Reacts with acids to release toxic sulfur oxides

Description:
- White solid
- No odor found
- Sinks in water and is slightly soluble in water
- Very flammable

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:
- Cover material to protect from wind, rain or spray
- Prevent runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- Use water to extinguish fire
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 103-85-5

n-PROPYL CHLOROFORMATE

UN 2740

Shipping Name: n-Propyl chloroformate
Other Names: Propyl chlorocarbonate
Propyl chloroformate

Hazards:

- Highly flammable
- Very irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterway, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Pungent, irritating odor
- Decomposes slowly in water to form toxic hydrochloric acid
- Highly flammable
- Vapors are heavier than air and will collect and stay in low area

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 109-61-5

PROPANETHIOL

UN 2402

Shipping Name: Propanethiols
Other Names: 1-Propanethiol
n-Propyl mercaptan
Propyl mercaptan

WARNING! • EXTREMELY FLAMMABLE!

Hazards:

- Container may BLEVE when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic sulfur oxides

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Offensive, skunk-like odor
- Floats on the surface of water and is slightly soluble in water
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of alcohol resistant (AFFF) foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using alcohol resistant (AFFF) foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 107-03-9

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
n-Undecylbenzene			1	1	0	
Uracil mustard			4	0	0	
Uranium hexafluoride	2978	Radioactive	4	0	2	~~W~~, R
Uranium metal (pyrophoric)	2979	Radioactive	3	4	4	~~W~~, R
Uranium peroxide			4	0	0	R
Uranyl acetate	9180		4	0	1	R
Uranyl nitrate	2981	Radioactive	4	0	0	OX,R
Uranyl sulfate			4	0	0	R
Urea			0	0	0	
Urea-ammonium nitrate solution			2	0	0	
Urethane			1	1	0	
Valeraldehyde	2058	Flammable	**1**	**3**	**0**	
Valeric acid	1760	Corrosive	**2**	**1**	**0**	
Vanadium	3285		3	2	0	
Vanadium pentoxide	2862	Poison	1	0	0	OX
Vanadyl sulfate	2931	Poison	1	0	0	
Vinyl acetylene			**2**	**4**	**3**	
Vinyl allyl ether			**2**	**3**	**2**	
Vinyl isobutyl ether	1304	Flammable	**2**	**3**	**2**	
Vinyl neodecanoate			2	2	1	
Xenon	2036	Nonflammable gas	0	0	0	
Xylenol	2261	Poison	2	2	0	
2,6-Xylidine	1711	Poison	**3**	**1**	**0**	
Zectran			3	1	0	
Zinc	1436	Dangerous when wet	0	2	2	~~W~~
Zinc acetate	9153		2	0	0	
Zinc ammonium chloride	9154		2	0	0	
Zinc arsenate	1712	Poison	3	0	0	
Zinc bichromate			1	0	1	OX
Zinc borate			2	0	0	
Zinc bromide	9156		1	0	0	
Zinc carbonate	9157		1	0	0	
Zinc chloride	2331	Corrosive	1	0	0	
Zinc chromate			2	0	0	OX
Zinc cyanide	1713	Poison	**3**	**0**	**0**	
Zinc dialkyldithiophosphate			3	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

TURPENTINE

UN 1299

Shipping Name: Turpentine
Other Names: Oil of turpentine
Spirits of turpentine
Turpentine oil
Turpentine spirits

Hazards:

- Highly flammable
- Container may BLEVE when exposed to fire
- Vapors are heavier than air and will collect and stay in low areas
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Characteristic odor
- Floats on water and is insoluble in water
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, experienced crews can use coordinated fog streams to sweep the flames off the surface of the burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 8006-64-2

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Ozone			2	0	3	OX
Paint, latex			**0**	**0**	**0**	
Paint, oil base	1263	Flammable	**1**	**3**	**0**	
Paint thinner	1263	Flammable	1	3	0	
Panfuran S			**0**	**1**	**0**	
Paraformaldehyde	2213	Flammable solid	**3**	**1**	**0**	
Paraldehyde	1264	Flammable	2	3	1	
Paraquat	2781	Poison	4	0	0	
Paraquat methosulfate			4	0	0	
Parathion	2783	Poison	4	0	0	
Paris green	1585	Poison	3	0	0	
1,2,3,7,8-Pentachlorodibenzofurans			4	1	0	
Pentachlorodibenzo-p-dioxins			4	1	0	
Pentachloroethane	1669	Poison	0	0	0	
Pentachlorophenate, sodium	2567	Poison	2	0	0	
Pentadecanol			0	1	0	
Pentadecylamine			1	1	0	
Pentaerythritol			0	2	0	
Pentaerythritol tetranitrate (PETN)	0411	1.1D Explosive	**2**	**2**	**3**	
Pentanoic acid	1760	Corrosive	**2**	**1**	**0**	
1-Pentene	1108	Flammable	**1**	**4**	**0**	
2-Pentene			**0**	**4**	0	
Pepper spray			**2**	**1**	**0**	
Peracetic acid	2131		**3**	**2**	**4**	**OX**
Perchloromethyl mercaptan	1670	Poison	2	0	0	
Perchloryl fluoride	3083	Poison gas	3	0	2	OX
PETN (Pentaerythritol tetranitrate)	0411	1.1D Explosive	**2**	**2**	**3**	
Petrolatum			**0**	**1**	**0**	
Petroleum naphtha	1255	Flammable	0	3	0	
Phenanthrene			**1**	**1**	**0**	
Phenylcarbylamine chloride	1672	Poison	2	1	0	
Phenylenediamine	1673	Poison	**2**	**1**	**0**	
Phenylhydrazine hydrochloride			3	2	0	
Phenyl isocyanate	2487	Poison	1	2	0	
Phenylmercuric acetate	1674	Poison	**3**	**1**	**0**	
o-Phenyl phenate, sodium			1	1	0	
o-Phenyl phenol			**1**	**1**	**0**	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

PERCHLORIC ACID

(50 TO 72%)

UN 1873

Shipping Name: Perchloric acid (50 to 72%)

WARNING!
- POISON! BREATHING THE VAPOR CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Containers may BLEVE when exposed to fire
- Reacts vigorously with water and produces heat
- Decomposition products upon heating include toxic hydrogen chloride

Description:
- Colorless fuming liquid
- No odor
- Soluble in water
- Nonflammable but may cause combustibles to ignite
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

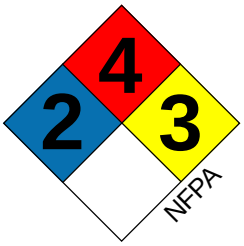
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material or runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7601-90-3



TETRAFLUOROETHYLENE
(INHIBITED)

UN 1081

Shipping Name: Tetrafluoroethylene, inhibited
Other Names: Perfluoroethylene

WARNING!
- EXTREMELY FLAMMABLE!
- MAY REACT WITH ITSELF WITHOUT WARNING BLOCKING RELIEF VALVES LEADING TO CONTAINER EXPLOSION!

Hazards:
- Container may explode when exposed to fire
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances to ignition sources and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Combustion products include toxic hydrogen fluoride

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Colorless compressed gas
- No odor
- Insoluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If venting sound suddenly increases and/or unexpectedly stops, withdraw immediately to a secure location

First Aid:
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Seek medical attention
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 116-14-3

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Phenyl phosphorous thiodichloride	2799	Corrosive	3	2	2	W
Phenyl silatrane			3	1	0	
Phorate	3018	Poison	4	1	0	
Phosacetim			4	1	0	
Phosfolan	2783	Poison	4	1	0	
Phosmet			3	1	0	
Phosphamidon			3	1	0	
Phosphoric acid	1805	Corrosive	**3**	**0**	**0**	
Phosphorus (amorphous red)	1338	Flammable solid	**1**	**1**	**1**	
Phosphorus (black)			1	1	0	
Phosphorus pentachloride	1806	Corrosive	**3**	**0**	**2**	**W**
Phosphorus pentafluoride	2198	Poison gas	4	0	2	W
Phosphorus pentoxide	1807	Corrosive	3	0	2	W
Phosporous trioxide	2578	Corrosive	3	4	0	W
Phthalic anhydride	2214	Corrosive	**3**	**1**	**0**	
Picoline	2313	Flammable	**2**	**2**	**0**	
Picrotoxin	1584	Poison	3	1	0	
Pine oil	1272	Flammable	**2**	**2**	**0**	
Pinacolyl alcohol			**1**	**2**	**0**	
Piperazine	2579	Poison	**2**	**2**	**0**	
Piprotal			4	1	0	
Platinum tetrachloride			2	0	0	
Polybrominated biphenyls	3152	Class 9	**4**	**1**	**0**	
Polybutene			0	1	0	
Polychlorinated biphenyls	2315	Class 9	2	1	0	
Polyethylene polyamines			0	1	0	
Polyphosphoric acid			3	0	1	
Polypropylene			0	2	0	
Polypropylene glycol			**0**	**1**	**0**	
Polypropylene glycol methyl ether			0	1	0	
Ponceau 3R			1	1	0	
Potassium arsenite	1678	Poison	3	0	0	
Potassium binoxalate			1	0	0	
Potassium bromate	1484	Oxidizer	2	0	0	OX
Potassium chlorate	1485	Oxidizer	1	0	0	OX
Potassium chromate			2	0	0	OX
Potassium cyanide	1680	Poison	**3**	**0**	**0**	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

PHOSPHORUS TRIBROMIDE

UN 1808

Shipping Name: Phosphorus tribromide
Other Names: Phosphorus bromide
Tribromophosphine

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROGEN BROMIDE AND PHOSPHORIC ACID!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Corrosive to most metals when moisture is present
- Decomposition products upon heating include toxic phosphine, phosphoric acid and hydrogen bromide

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid that fumes in moist air
- Sharp, irritating odor
- Sinks in water and reacts violently with water releasing toxic hydrobromic acid and phosphoric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material; if water must be used, use it in flooding quantites
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7789-60-8

PHOSPHORUS OXYCHLORIDE

UN 1810

Shipping Name: Phosphorus oxychloride
Other Names: Phosphorus chloride oxide
Phosphorus oxide trichloride
Phosphoryl chloride
Phosphorus oxytrichloride

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS WITH WATER TO PRODUCE HEAT AND HYDROCHLORIC ACID!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Rapidly corrodes wet metals producing highly flammable hydrogen gas
- Decomposition products upon heating include toxic hydrogen chloride and phosphoric acid

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to slightly yellow oily liquid that fumes in moist air
- Pungent, musty disagreeable odor
- Sinks in water and reacts violently in water to form toxic hydrochloric acid and phosphoric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at 36° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10025-87-3

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Pyrrolidine	1922	Flammable	2	3	1	
2-Pyrrolidone			2	1	0	
Quinoline	2656	Poison	2	1	0	
R 12	1028	Nonflammable gas	1	0	0	
R 22	1018	Nonflammable gas	0	0	0	
Refrigerant 12	1028	Nonflammable gas	1	0	0	
Refrigerant 22	1018	Nonflammable gas	0	0	0	
Resorcinol	2876	Poison	2	1	0	
Ricin			4	1	0	
Rubidium	1423	Dangerous when wet	3	4	3	₩
Saccharin			2	1	0	
Safrole			1	1	0	
Salicylaldehyde			0	2	0	
Salicylic acid			0	1	0	
Saltpeter	1942	Oxidizer	2	0	2	OX
Saxitoxin			4	1	0	
Selenic acid	1905	Corrosive	2	0	0	
Selenium(powder)	2658	Poison	1	1	1	
Selenium dioxide	2811	Poison	1	0	0	
Selenium hexafluoride	2194	Poison gas	4	0	0	
Selenium oxychloride	2879	Corrosive	2	0	1	
Selenium trioxide			1	0	0	
Semicarbazide hydrochloride			2	1	0	
Silane	2203	Flammable gas	1	4	3	
Silica, crystalline			0	0	0	
Silica, gel			0	0	0	
Silicon dioxide (sand)			0	0	0	
Silicon (powder)	1346	Flammable solid	1	2	0	
Silver			0	0	0	
Silver acetate			0	0	0	
Silver carbonate			1	0	0	
Silver iodate			2	0	0	
Silver nitrate	1493	Oxidizer	2	0	0	OX
Silver oxide			0	0	0	

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"**R**" under special situations signifies a radioactivity hazard.

TRICHLOROSILANE

UN 1295

Shipping Name: Trichlorosilane
Other Names: Silicochloroform
Trichloromonosilane

WARNING!

- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- EXTREMELY FLAMMABLE! SPONTANEOUSLY COMBUSTS IN AIR!
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE AND EXTREMELY FLAMMABLE AND EXPLOSIVE HYDROGEN GAS!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flash back
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Combustion products include toxic hydrogen chloride
- Corrosive to common metals releasing highly flammable hydrogen gas

Description:

- Colorless liquid that fumes upon contact with air
- Sharp choking odor
- Sinks in water and reacts violently with water to produce toxic hydrochloric acid and extremely flammable and explosive hydrogen gas
- Extremely flammable
- Vapors are heavier than air and will collect and stay in low areas
- Boils at 90° F
- Produces large amounts of vapor

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire, and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with medium expansion AFFF alcohol resistant foam
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10025-78-2

SILICON CHLORIDE

UN 1818

Shipping Name: Silicon tetrachloride
Other Names: Tetrachlorosilane

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROGEN CHLORIDE!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposition products upon heating include toxic hydrogen chloride
- In the presence of moisture is corrosive to most metals

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless fuming liquid
- Suffocating odor
- Sinks in water and reacts violently with water to produce silicic acid and hydrochloric acid; is insoluble in water
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large volumes of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Do not use water directly on the material; material reacts violently with water to produce toxic hydrochloric acid
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Do not allow water to come in contact with the material; Material does not burn; fight surrounding fire with an agent appropriate for the burning material; if material is involved in a fire, use dry chemical to extinguish, if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other sign of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 10026-04-7

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Silver sulfate			1	0	0	
Silvex	2765	Poison	2	1	0	
Simazine			1	1	0	
Sodium alkylbenzene sulfonates			2	0	0	
Sodium alkyl sulfates			1	0	0	
Sodium amide			3	3	2	W
Sodium arsenate	1685	Poison	3	0	0	
Sodium arsenite	2027	Poison	3	0	0	
Sodium bifluoride	2439	Corrosive	3	0	1	
Sodium bisulfite	2693	Corrosive	1	0	0	
Sodium borate			0	0	0	
Sodium borohydride	1426	Dangerous when wet	3	2	1	W
Sodium borohydride (15% or less)			3	0	1	
Sodium cacodylate	1688	Poison	4	0	0	
Sodium chlorate	1495	Oxidizer	1	0	2	OX
Sodium chlorate solution	2428	Oxidizer	1	0	0	OX
Sodium chromate			2	0	0	OX
Sodium dichloro-s-triazinetrione	2465	Oxidizer	**2**	**0**	**2**	**$\overline{OX}$**
Sodium dichromate	1479	Oxidizer	2	0	1	OX
Sodium ferrocyanide			1	0	0	
Sodium fluoride	1690	Poison	**3**	**0**	**0**	
Sodium fluoroacetate	2629	Poison	4	0	0	
Sodium fluorosilicate	2674	Poison	2	0	2	
Sodium hydride	1427	Dangerous when wet	**3**	**3**	**2**	**W**
Sodium hydrosulfide solution	2922	Corrosive	3	0	0	
Sodium 2-mercaptobenzothiazol solution			3	0	0	
Sodium methylate	1431	Spontaneously combustible	2	4	1	W
Sodium nitrate	1498	Oxidizer	1	0	1	OX
Sodium nitrite	1500	Oxidizer	2	0	1	OX
Sodium oxalate			1	0	0	
Sodium perchlorate	1502	Oxidizer	2	0	2	OX
Sodium persulfate			2	0	0	
Sodium phosphate	9147		0	0	0	
Sodium phosphate, tribasic			1	0	0	
Sodium phosphide	1432	Dangerous when wet	4	4	3	W

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Sodium saccharin			1	1	0	
Sodium selenate	2630	Poison	4	0	0	
Sodium selenite	2630	Poison	4	0	0	
Sodium silicate			0	0	0	
Sodium sulfate			0	0	0	
Sodium sulfide	1385	Spontaneously combustible	**3**	**1**	**1**	
Sodium sulfite			1	0	1	
Sodium tellurite			2	0	0	
Sodium thiocyanate			2	0	0	
Sorbitol			0	1	0	
Stannous fluoride			2	0	0	
Stearic acid			**1**	**1**	**0**	
Sterigmatocystin			1	1	0	
Stibine	2676	Poison gas	**4**	**4**	**2**	
Strontium chromate			1	0	1	₩
Strychnine sulfate	1692	Poison	4	1	0	
Sucrose			0	1	0	
Sulfallate			1	1	0	
Sulfotep	1704	Poison	4	1	1	
Sulfurous acid	1833	Corrosive	3	0	2	
Sulfur pentafluoride			2	0	0	
Supracide			3	1	0	
T			4	1	0	
Tall oil			**0**	**1**	**0**	
Tannic acid			**0**	**1**	**0**	
Tar	1999	Flammable	**0**	**2**	**0**	
Tellurium (powder)			3	2	2	
Terbufos			4	3	0	
Terephthalic acid			**0**	**1**	**0**	
Terphenyl			**0**	**1**	**0**	
Terpinolene	2541	Flammable	1	2	0	
Testosterone and its esters			1	1	0	
Tetrabutyl titanate			0	2	0	
2,3,7,8- Tetrachlorodibenzofurans			4	1	0	
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	2378		4	1	0	
Tetrachlorvinphos			1	1	0	
Tetradecanol			**0**	**1**	**0**	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

SULFUR TRIOXIDE

(INHIBITED)

UN 1829

Other Names: Sulfan
Sulfur anhydride
Sulfuric anhydride
Sulfuric oxide

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Fire fighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC SULFURIC ACID!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE or explode when exposed to fire
- Corrosive to common metals to form flammable hydrogen gas
- Decomposition products upon heating include toxic sulfur oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to white fuming solid or liquid
- Irritating, pungent acid-like odor
- Reacts violently with water to form sulfuric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low area
- Produces large amounts of vapor
- Freezes below 62° F and boils at 112° F

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Cover solid material to protect from wind, rain or spray
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- If possible, do not allow water to come in contact with the material. Material does not burn; fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Victims should be examined by a physician as soon as possible
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7446-11-9

THIONYL CHLORIDE

UN 1836

Shipping Name: Thionyl chloride
Other Names: Sulfinyl chloride
Sulfur chloride oxide
Sulfurous oxychloride

WARNING!

- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! SKIN AND EYE CONTACT CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER TO FORM TOXIC HYDROCHLORIC ACID!

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposition products upon heating include toxic hydrogen chloride and sulfur oxides

Awareness and Operational Level Training Response:

- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire, deny entry and call for expert help
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated run off enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow or red fuming liquid
- Suffocating, pungent odor
- Reacts violently with water to form hydrochloric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and run off from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain run off
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent other than water or foam; do not allow water to come in contact with the material; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7719-09-7

SULFURYL CHLORIDE

UN 1834

Shipping Name: Sulfuryl chloride
Other Names: Sulfonyl chloride
Sulfur oxychloride
Sulfuric oxychloride

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! EXTREMELY CORROSIVE TO SKIN AND EYES! CAN CAUSE SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIGOROUSLY WITH WATER TO FORM TOXIC HYDROCHLORIC AND SULFURIC ACIDS!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Decomposition products upon heating include highly toxic sulfur oxides and hydrogen chloride
- Reacts with metals in the presence of moisture to release highly flammable and explosive hydrogen gas

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless liquid
- Very pungent odor
- Sinks in water and reacts vigorously with water producing toxic hydrochloric and sulfuric acids
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Produces large amounts of vapor

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water well away from the release to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:
- If possible, do not allow water to come in contact with the material. Material does not burn; if material is involved in a fire, fight surrounding fire with an agent other than water; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7791-25-5

SULFUR TETRAFLUORIDE

UN 2418

Shipping Name: Sulfur tetrafluoride
Other Names: Tetrafluorosulfurane

WARNING!
- POISON ! BREATHING THE GAS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) provides NO protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER DIRECTLY ON THE MATERIAL! REACTS WITH WATER TO FORM TOXIC HYDROFLUORIC ACID!

Hazards:
- Gas is heavier than air and will collect and stay in low areas
- Container may explode or BLEVE when exposed to fire
- Decomposes upon heating to form toxic sulfur oxides and hydrogen fluoride gas
- Exposure to the liquid may cause frostbite

Awareness and Operational Level Training Response:
- DO NOT ATTEMPT RESCUE!
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:
- Colorless gas
- Distinct sulfur odor like rotten eggs
- Reacts with water to form toxic hydrofluoric acid
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- Shipped and stored as a compressed liquefied gas

Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Use large amounts of water well away from the material to disperse the gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine gas by closing doors and shutting down HVAC systems

FIRE:
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material; if possible, do not allow water to come in contact with the material. If material is involved in a fire, use dry chemical to extinguish; if water must be used, use it in flooding quantites
- If container is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- Material does not burn; fight surrounding fire with an agent appropriate for the burning material

First Aid:
- DO NOT ATTEMPT RESCUE!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
- Victims should be examined by a physician as soon as possible
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: skin burns can be treated with calcium gluconate gel

CAS: 7783-60-0

TOLUENE DIISOCYANATE

UN 2078

Shipping Name: Toluene diisocyanate
Other Names: 2,4-TDI
TDI
Toluene 2,4-diisocyanate

WARNING!
- POISON! BREATHING THE VAPORS, SKIN CONTACT OR SWALLOWING THE MATERIAL CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Vapors are heavier than air and will collect and stay in low areas
- Extremely irritating to skin, eyes, nose and lungs
- Container may explode or BLEVE when exposed to fire
- May react with itself without warning blocking relief valves and causing a violent explosion
- Reacts with water releasing carbon dioxide
- Combustion or decomposition products upon heating include toxic nitrogen oxides and cyanide vapors

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- White to pale yellow liquid or solid
- Sharp pungent smell
- Sinks in water and reacts with water to form carbon dioxide
- Flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes between 67° F and 71° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Cover material to protect from wind, rain or spray
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts. Under favorable conditions, specifically trained personnel may use coordinated fog streams to extinguish burning liquid. Keep exposures cool to prevent re-ignition. Do not direct straight streams into the liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed

CAS: 584-84-9

TETRAETHYL LEAD

NA 1649

Shipping Name: Tetraethyl lead, liquid
Other Names: TEL
Tetraethylplumbane

Hazards:

- Container may BLEVE when exposed to fire
- Inhaling the vapors or absorption through the skin can cause severe lead poisoning
- Slightly irritating to skin, eyes, nose and lungs
- Vapors are heavier than air and will collect and stay in low areas

Awareness and Operational Level Training Response:

- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless oily liquid; often dyed red, orange or blue
- Pleasant fruity odor
- Sinks in water and is insoluble in water
- Very flammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -17° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

First Aid:

- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention

CAS: 78-00-2

TELLURIUM HEXAFLUORIDE

UN 2195

Shipping Name: Tellurium hexafluoride
Other Names: Tellurium fluoride

WARNING!
- POISON! BREATHING THE GAS CAN KILL YOU!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Gas is heavier than air and will collect and stay in low areas
- Container may explode when exposed to fire
- Irritating to skin, eyes, nose and lungs
- Decomposes upon heating to release toxic hydrofluoric acid and tellurium

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies

Description:

- Colorless, compressed gas
- Repulsive odor
- Decomposes slowly in water
- Nonflammable
- Gas is heavier than air and will collect and stay in low areas
- May impart a garlic-like odor to the breath and sweat after exposure

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Use large amounts of water to disperse gas - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, confine gas by closing doors and shutting down HVAC systems while evacuating the occupants

FIRE:

- Material does not burn; fight surrounding fire with an agent appropriate for the burning material
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: skin burns can be treated with calcium gluconate gel

CAS: 7783-80-4

TITANIUM TETRACHLORIDE

UN 1838

Shipping Name: Titanium tetrachloride
Other Names: Tetrachlorotitanium
Titanium chloride
Titanium (IV) chloride

WARNING! ● DO NOT USE WATER! REACTS WITH WATER TO FORM TOXIC HYDROCHLORIC ACID!

Hazards:

- Severely irritating; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Vapors are heavier than air and will collect and stay in low areas
- Containers may BLEVE when exposed to fire
- Decomposition products upon heating include toxic hydrogen chloride
- Corrosive to most metals

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Container may BLEVE when exposed to fire
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to light yellow fuming liquid
- Vapors react with moisture in air forming a white cloud
- Pungent odor
- Reacts with water to form hydrochloric acid and heat
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas
- Freezes at -11° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Material does not burn; fight surrounding fire with an agent other than water; if possible, do not allow water to come in contact with the material. If water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7550-45-0

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
1-Tetradecene			0	1	0	
Tetradecyl benzene			0	1	0	
Tetraethyl dithiopyrophosphate	1704	Poison	4	1	1	
Tetraethylene glycol			1	1	0	
Tetraethylene pentamine	2320	Corrosive	2	1	0	
Tetraethyl tin			3	3	0	
Tetrafluorohydrazine	1955		2	1	3	
Tetrafluoromethane	1982	Nonflammable gas	0	0	0	
Tetrahydronaphthalene			1	2	0	
1,2,3,5-Tetramethylbenzene			0	2	0	
Tetramethyl lead			3	3	3	
Tetramethylsilane	2749	Flammable	2	4	0	
Tetrodotoxin			4	1	0	
Thallium			3	1	0	
Thallium acetate			3	0	0	
Thallium carbonate			3	0	0	
Thallium nitrate	2727	Poison	3	0	0	
Thallium sulfate	1707	Poison	3	0	0	
Thallous carbonate			3	0	0	
Thallous chloride			3	0	0	
Thallous malonate			3	0	0	
Thallous sulfate			3	0	0	
4-Thiapentanal	2785	Poison	2	1	0	
Thioacetamide			2	1	0	
Thioacetic acid	2436	Poison	2	3	0	
Thiobencarb			1	1	0	
Thiocarbazide			2	1	0	
4,4'-Thiodianiline			2	1	0	
Thiodiglycol			2	1	0	
Thiofanox			3	1	0	
Thionazin	3018		4	1	0	
Thiophosgene	2474	Poison	1	1	1	~~W~~
Thiosemicarbazide			3	1	0	
Thiram	2771	Poison	2	1	0	
Thorium dioxide			2	1	0	R
Thorium nitrate	2976	Radioactive	1	1	0	OX,R
Titanium dioxide			0	0	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.

TETRANITROMETHANE

UN 1510

Shipping Name: Tetranitromethane
Other Names: Tetran
TNM

WARNING!
- EXPLOSIVE! MAY EXPLODE WHEN HEATED OR SHOCKED!
- STRONG OXIDIZER! WILL INCREASE THE INTENSITY OF A FIRE! MAY CAUSE FIRE UPON CONTACT WITH COMBUSTIBLES!

Hazards:
- Severely irritating to skin, eyes, nose and lungs; prolonged contact with skin can cause burns
- May interfere with the body's ability to use oxygen
- Vapors are lighter than air but may collect and stay in low areas
- Combustion products include toxic nitrogen oxides
- Corrosive to iron, copper, brass, zinc and rubber

Description:
- Colorless to yellow oily liquid
- Pungent to acrid biting odor
- Sinks in water and is insoluble in water
- Flammable
- Vapors are lighter than air but may collect and stay in low areas
- Freezes at 56° F

Awareness and Operational Level Training Response:
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate or shelter in place the immediate area and down wind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

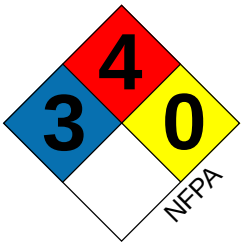
Operational Level Training Response:

RELEASE, NO FIRE:
- Stop the release if it can be done safely
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of release
- Use large amounts of water to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Approach fire with extreme caution; consider letting fire burn
- Specially trained personnel operating from a safe distance can fight fires using foam or dry chemical if available in sufficient amounts or use fog streams to extinguish burning liquid. Keep exposures cool to protect against re-ignition. Do not direct straight streams into liquid.
- Cool exposed containers with large quantities of water from unattended equipment or remove containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support (CPR) as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing
- Note to physician: can cause methemoglobinemia; if symptoms indicate, methylene blue is the initial antidote

CAS: 509-14-8



TRIMETHYLAMINE

(ANHYDROUS)

UN 1083

Shipping Name: Trimethylamine, anhydrous

Other Names: TMA

WARNING! ● EXTREMELY FLAMMABLE!
● CONTAINER MAY BLEVE OR EXPLODE WHEN EXPOSED TO FIRE!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Fire fighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- Gas is heavier than air and will collect and stay in low areas
- Gas may travel long distances and flashback
- Gas in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- Contact with liquid may cause frostbite
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay uphill and upwind
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE or explosion
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless compressed gas
- Pungent fishy odor
- Completely soluble in water
- Extremely flammable
- Gas is heavier than air and will collect and stay in low areas
- May be shipped as an aqueous (water) solution; which is highly flammable and will generate large amounts of flammable gas
- A liquid below 37° F

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent contaminated runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- Do not extinguish the fire unless the flow of the gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Frostbite - warm injured area in very warm water
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 75-50-3

TRINITROTOLUENE

UN 0209 (Dry or wetted with less than 30% water)
UN 1356 (Wetted with more than 30% water)

Other Names: 2,4,6-Trinitrotoluene
TNT

WARNING! ● EXTREMELY FLAMMABLE!
● CONTAINER MAY EXPOLED WHEN EXPOSED TO FIRE!

Hazards:
- Irritating to skin, eyes, nose and lungs
- May interfere with the body's ability to use oxygen
- Combustion products include toxic nitrogen oxides

Awareness and Operational Level Training Response:
- Do not put yourself in danger by entering a contaminated area to rescue victim!
- Stay upwind and uphill
- Determine the extent of the problem
- BACK OFF! - Isolate a wide area around the release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of explosion
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Colorless to pale yellow solid
- No odor
- Sinks in water and is insoluble in water
- Very flammable

Operational Level Training Response:

RELEASE, NO FIRE:
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release

FIRE:
- If material is on fire and conditions permit, DO NOT EXTINGUISH. Cool exposures using unattended monitors. If fire must be extinguished, use any agent appropriate for the burning material.
- Cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (unvented container distorts, bulges or shows any other signs of expanding), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue victim!
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- Note to physician: can cause methemoglobinemia: if symptoms indicate, methylene blue is the inital antidote

CAS: 8001-26-1

TRICHLOROACETYL CHLORIDE

UN 2442

Shipping Name: Trichloroacetyl chloride

Other Names: Trichloroacetic acid chloride

WARNING! ● DO NOT USE WATER! REACTS VIOLENTLY WITH WATER RELEASING TOXIC HYDROCHLORIC ACID!

Hazards:

- Severely irritating to skin, eyes, nose and lungs; skin and eye contact causes severe burns and blindness
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Combustion and decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless to yellow liquid
- Pungent, irritating smell
- Reacts violently with water to form toxic hydrochloric acid
- Flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk
- If in a building, evacuate building and confine vapors by closing doors and shutting down HVAC systems

FIRE:

- Material does not easily burn; fight surrounding fire with an agent appropriate for the burning material; if possible do not allow water to come in contact with the material; if water is used, use in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of expanding), withdraw immediately to a secure location

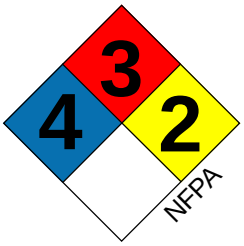
First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 76-02-8

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Triethyl benzene			1	2	0	
Triethylene glycol			1	1	0	
Triethylene thiophosphoramide			3	1	0	
Triethyl phosphate			0	1	1	
Triethyl phosphite	2323	Flammable	1	2	0	
Trifluoroacetic acid	2699	Corrosive	3	1	0	
3-Trifluoromethylaniline	2948	Poison	3	1	0	
Trifluralin			1	1	0	
Triisobutylene	2324	Flammable	1	2	0	
Triisopropanol amine			2	1	0	
Trimethylacetic acid			2	2	0	
Trimethylacetyl chloride	2438	Corrosive	3	3	2	₩
2,4,6-Trimethyl aniline			2	1	0	
Trimethyl benzene	2325	Flammable	0	2	0	
Trimethylhexamethylenediamine	2327	Corrosive	1	1	0	
Trimethylhexamethylene diisocyanate	2328	Poison	2	2	1	
Trimethyl phosphite	2329	Flammable	1	2	0	
Trimethyl tin chloride			3	2	0	
Trinitrobenzene (dry or wetted with <30% water	0213	Explosive 1.1D	2	4	4	
Trinitrobenzene (wetted with >30% water)	1354	Flammable solid	2	4	2	
Trinitrobenzoic acid (dry or wetted with <30% water)	0215	Explosive 1.1D	2	3	3	
Trinitrobenzoic acid (wetted with >30% water)	1355	Flammable solid	2	3	2	
Triphenyl tin chloride			3	2	0	
Tripropylene glycol			0	1	0	
Tripropylene glycol methyl ether			0	1	0	
Tris(aziridinyl)phosphine oxide	2501	Corrosive	3	0	2	
Tris-(2,3-dibromopropyl) phosphate			1	1	0	
Trithion			4	1	0	
Trixylenyl phosphate			2	1	0	
Trypan blue			0	1	0	
Undecane	2330	Flammable	0	2	0	
Undecanoic acid			1	1	0	
Undecanol			1	1	0	
1-Undecene			0	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.



TRIMETHOXYSILANE

NA 9269

Shipping Name: Trimethoxysilane

WARNING!
- POISON! BREATHING THE VAPORS, SWALLOWING THE MATERIAL OR SKIN CONTACT CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel

Hazards:

- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas
- Containers may BLEVE when exposed to fire
- Vapors may travel long distances to ignition sources and flashback
- Vapors in confined areas (e.g., tanks, sewers, buildings) may explode when exposed to fire
- May react with itself when heated plugging relief valves causing a violent explosion

Awareness and Operational Level Training Response:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Remove all ignition sources
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Evacuate the immediate area and downwind for a large release
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:

- Colorless liquid
- Sweet odor
- Floats on water and is insoluble in water but slowly reacts with water forming a corrosive mixture
- Highly flammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Training Response:

RELEASE, NO FIRE:

- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Consider the application of foam to large areas of spilled liquid to control vapors
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:

- If material is on fire, and conditions permit, DO NOT EXTINGUISH.
- Material reacts with water but can be extinguished with medium expansion AFFF alcohol resistant foam
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:

- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 2487-90-3

VANADIUM OXYTRICHLORIDE

UN 2443

Shipping Name: Vanadium oxytrichloride
Other Names: Vanadium oxychloride
Vanadium trichloride oxide
Vanadyl trichloride

WARNING!
- POISON! BREATHING THE VAPORS CAN KILL YOU! SKIN AND EYE CONTACT CAUSES SEVERE BURNS AND BLINDNESS!
- Firefighting gear (including SCBA) does not provide adequate protection. If exposure occurs, remove and isolate gear immediately and thoroughly decontaminate personnel
- DO NOT USE WATER! REACTS VIOLENTLY WITH WATER RELEASING TOXIC HYDROGEN CHLORIDE VAPOR!

Hazards:
- Vapors are heavier than air and will collect and stay in low areas
- Container may BLEVE when exposed to fire
- Corrosive to most metals in the presence of moisture
- Decomposition products upon heating include toxic hydrogen chloride

Awareness and Operational Level Response:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Stay upwind and uphill
- Determine the extent of the problem
- Isolate the area of release or fire and deny entry
- Evacuate or shelter in place the immediate area and downwind for a large release
- For container exposed to fire evacuate the area in all directions because of the risk of BLEVE
- Notify local health and fire officials and pollution control agencies
- If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated water

Description:
- Yellow liquid that becomes thick and blood red when mixed with water
- Emits red fumes upon contact with moist air
- Sharp irritating and unpleasant odor
- Sinks in water and reacts violently with water to form toxic hydrochloric acid
- Nonflammable
- Vapors are heavier than air and will collect and stay in low areas

Operational Level Response:
RELEASE, NO FIRE:
- Stop the release if it can be done safely from a distance
- Prevent material and runoff from entering sewers and waterways if it can be done safely well ahead of the release
- Use large amounts of water well away from the material to disperse vapors - contain runoff
- Ventilate confined area if it can be done without placing personnel at risk

FIRE:
- Material does not burn; fight surrounding fire with an agent other than water or foam; if possible, do not allow water to come in contact with material; if water must be used, use it in flooding quantities
- If material is not leaking, cool exposed containers with large quantities of water from unattended equipment or remove intact containers if it can be done safely
- If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure location

First Aid:
- Do not put yourself in danger by entering a contaminated area to rescue a victim
- Provide Basic Life Support/CPR as needed
- Decontaminate the victim as follows:
  - Inhalation - remove the victim to fresh air and give oxygen if available
  - Skin - remove and isolate contaminated clothing (including shoes) and wash skin with soap and large volumes of water for 15 minutes
  - Eye - rinse eyes with large volumes of water or saline for 15 minutes
  - Swallowed - do not make the victim vomit
- Seek medical attention
- Toxic effects may be delayed
- For skin burns decontaminate with water and apply a clean dry dressing

CAS: 7727-18-6

Chemical Name	UN/NA#	DOT Placard	Health	Fire	Reactivity	Special Situations
			Refer to Page 550 for explanation of numbers			
Zinc dithionite	1931	Class 9		0	1	
Zinc fluoride	9158		2	0	0	
Zinc fluoroborate			2	0	0	
Zinc fluorosilicate	2855	Poison	2	0	0	
Zinc formate	9159		1	0	0	
Zinc nitrate	1514	Oxidizer	1	0	0	OX
Zinc oxide			0	0	0	
Zinc phenolsulfonate	9160		1	0	0	
Zinc potassium chromate			2	1	0	
Zinc sulfate	9161		0	0	0	
Zineb			1	1	1	
Ziram			1	1	0	
Zirconium	2008	Spontaneously combustible	1	4	1	
Zirconium acetate			1	0	0	
Zirconium nitrate	2728	Oxidizer	1	0	0	OX
Zirconium oxychloride			3	0	0	
Zirconium potassium fluoride	9162		2	0	0	
Zirconium sulfate	9163	Corrosive	0	0	0	
Zirconium tetrachloride	2503	Corrosive	**3**	**0**	**2**	**~~W~~**
Zylylene dichloride			2	1	0	

Notes: NFPA -704 designations shown in green are from NFPA49 or NFPA325. Those in black are designations assigned by the authors.
"**R**" under special situations signifies a radioactivity hazard.