DSV Bibby Topaz
Incident 18th Sept 2012

Agenda

- Welcome & introductions
- Investigation team & TOR
- Bibby Topaz specification
- Incident Timeline
- Emergency Response notification
- Diver Medical Treatment Timeline
- Vessel Assurance
- Lessons Learned

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Investigation

- Investigation Team
  - Gail Ritchie, Lead Risk & Safety Advisor (Team Lead)
  - Katherine Meffen, Risk & Safety Advisor
  - Barry Porter, Diving Operations Manager
  - Tom Paling, OSS General Manager
  - Martyn Ramsbottom, Marine Superintendent
  - Chris Cleghorn, Offshore Risk & Safety Advisor
  - Kongsberg
  - Noble Denton
  - EON (Client)
  - Health & Safety Executive

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Investigation

- Terms of Reference (5 Barrier Analysis)
  - Design;
  - Maintenance;
  - Process / Procedures;
  - Competence;
  - Behaviours;

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Investigation - References

- Witness statements / interviews;
  - Dive team, ROV, Bridge, Marine, Survey,
- Blackbox;
  - Diver 1 & 2 hat camera / audio, Dive Supervisor audio, Bell interior & exterior, ROV, Bridge VDR
- Logs;
  - Dive, DP log, DP alarm, Bridge, Survey, DPR
- Design;
  - FMECA, DP Control System (Software & Hardware)
- Documentation;
  - Vessel Assurance, FMEA, Dive & Vessels Ops Manual, Emergency Contingency Manuals, Subsea Installation procedures, project risk management, TM Master PMS, Change Management, Competence & Training records,

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- Main Particulars
  - 2008 Build
  - Overall Length 106.6m, Breadth 22.0m
  - Gross Tonnage 8009 tonnes
- DP System Kongsberg K-POS DP 31
  - 2 x DGPS; Kongsberg 200 & 132
  - 2 x HIPAP; Kongsberg 500
  - 2 x Light Taut Wire; Bandak Mk2
  - 1 x RadaScan; V115 Propulsion

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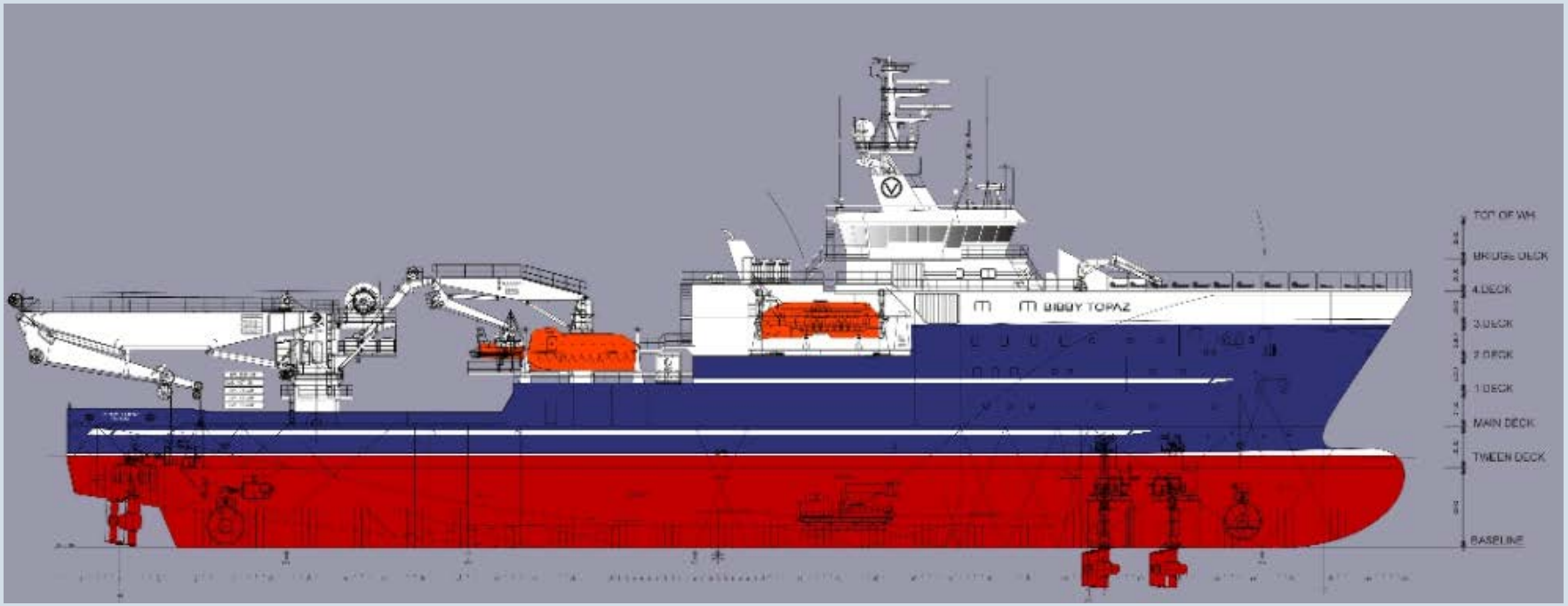

- Propulsion
  - Main Azimuth Thrusters - 2 x Wartsila type each rated at 3000 kW
  - Retractable Azimuth Thrusters - 2 x Wartsila type each rated at 2200kW
  - Tunnel Thrusters (1 fwd & 1 aft) - 2 x Wartsila type each rated at 2000 kW

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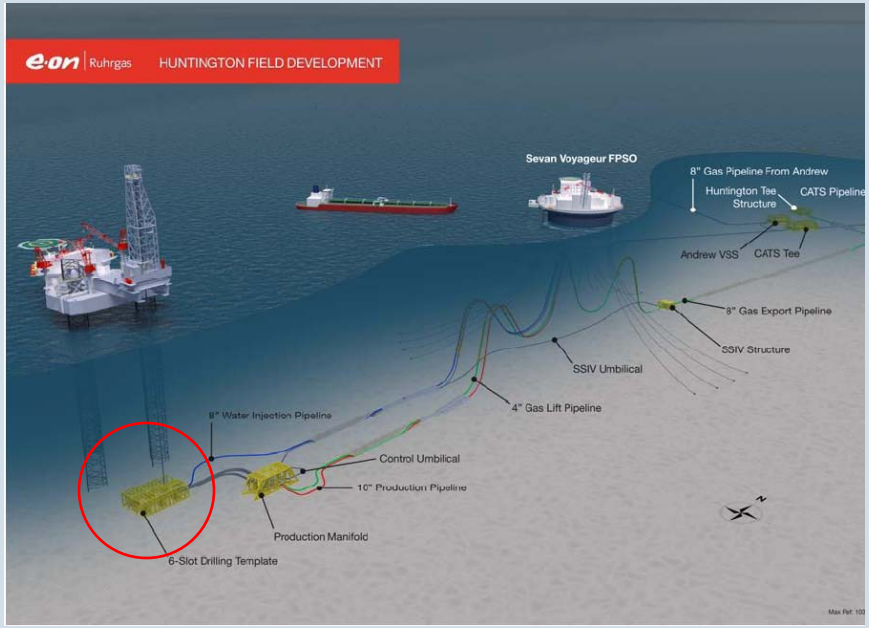
Scope of Work

- Development of Huntington Field as a subsea tieback to FPSO
- Date 18th Sept 2012
- Water depth 91m
- Weather;
  - Wind NW
  - Wind speed gusting up to 30 kts
  - Sig wave height 4.0m
- 2 x DGPS, 2 x HiPap, 1 x light taut wire



- 3 Generators online, 5 out of 6 thrusters running & selected into DP
- Thruster 4, stern thruster shut down

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Scope of Work

- Vessel set up west of drilling template
- MOC conducted addressing change of opening roof panel to gaining access from side
- Spool metrology within Drilling Template
- Venting annulus gas prior to barrier testing
- HPPS Downline deployed
- Tugger line deployed

Time Line

- 20.13 - Dive 047, starboard bell locked off
- 20.31 – Bell at depth
  - Bell located upstream of template structure
- 20.37 – diver 2 left bell
- 20.46 – diver 1 left bell
  - Divers umbilical length into template – 27m from bell

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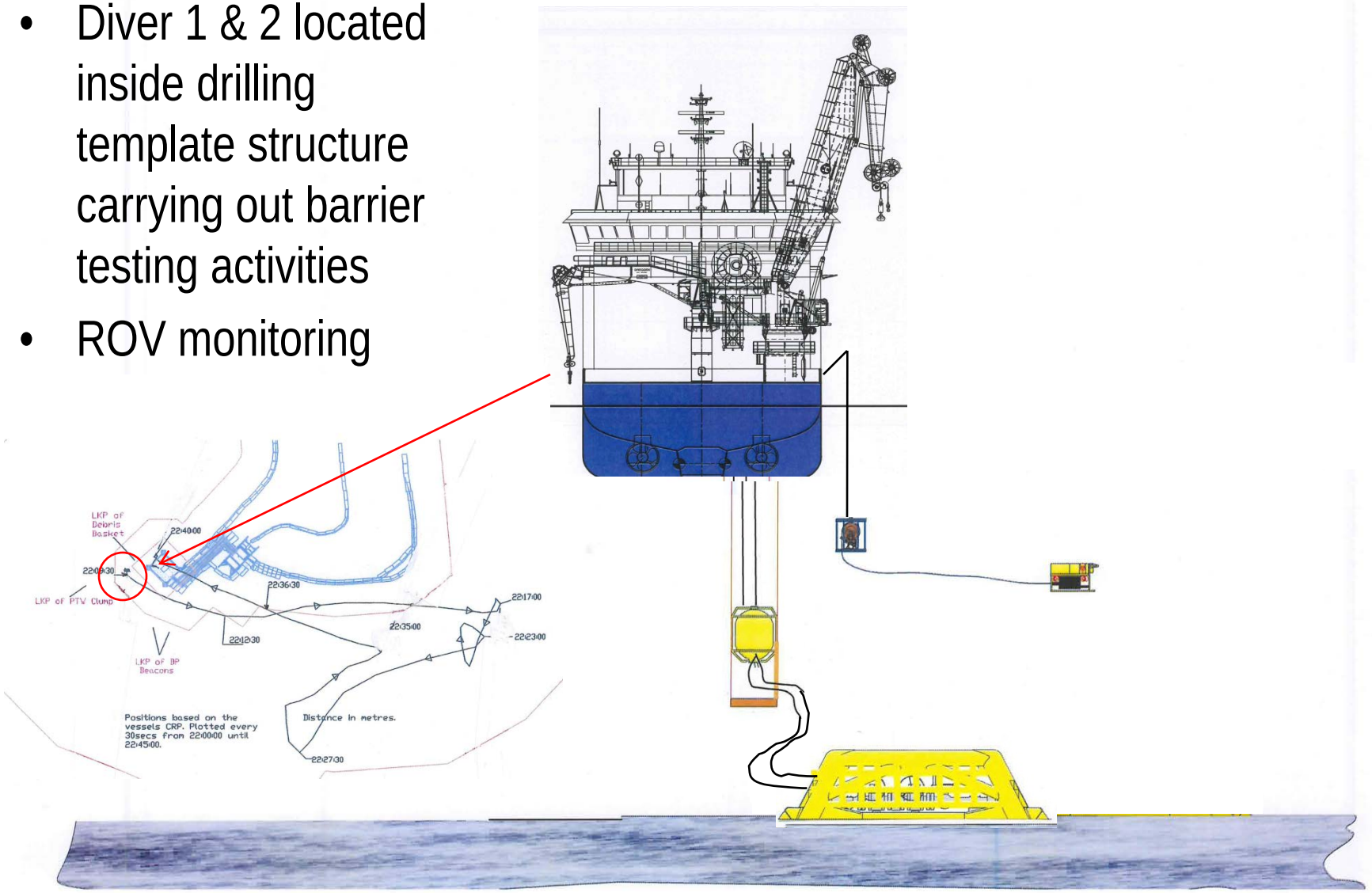
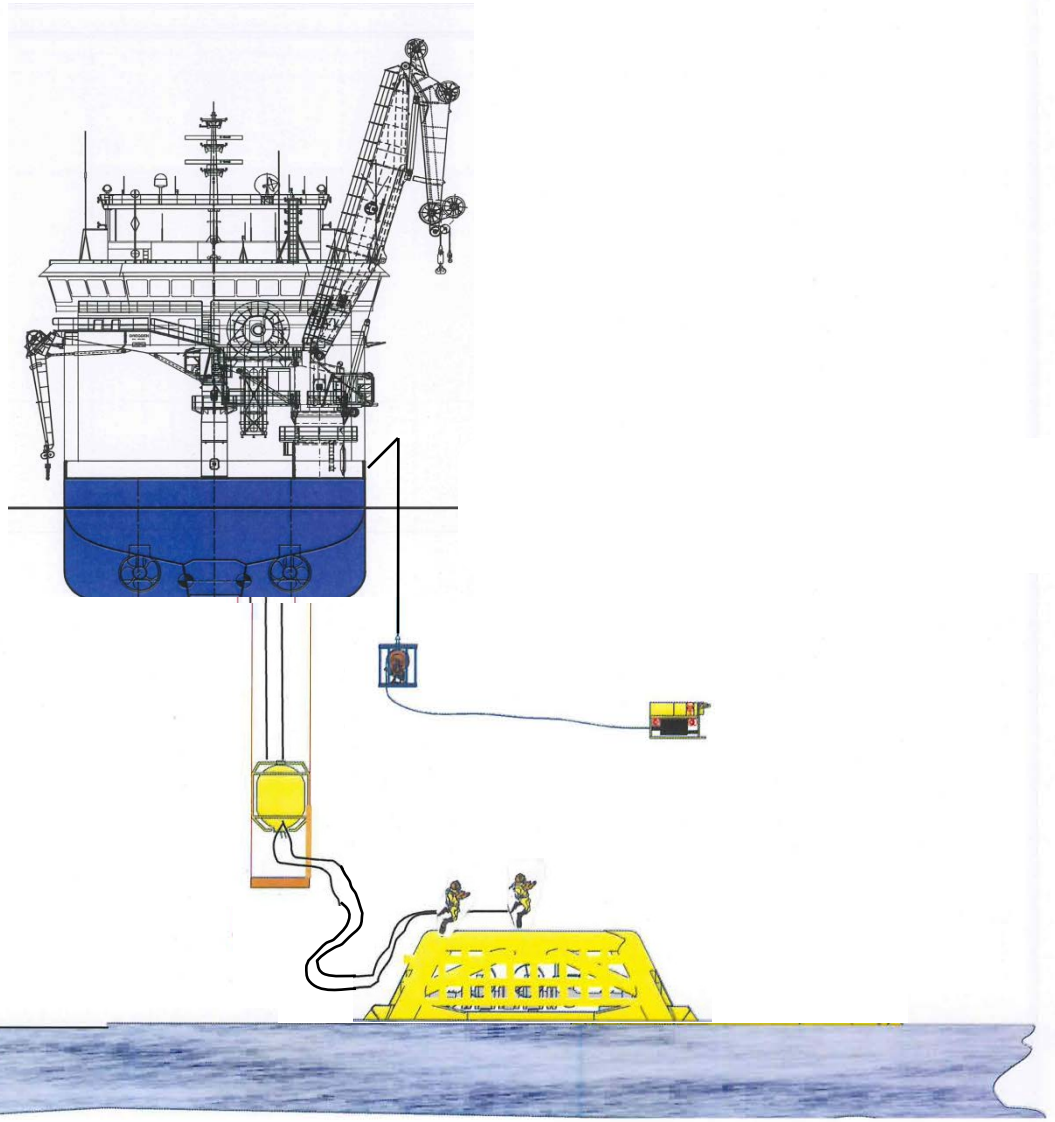
Time Line – 20.49 to 22.09

- Diver 1 & 2 located inside drilling template structure carrying out barrier testing activities
- ROV monitoring



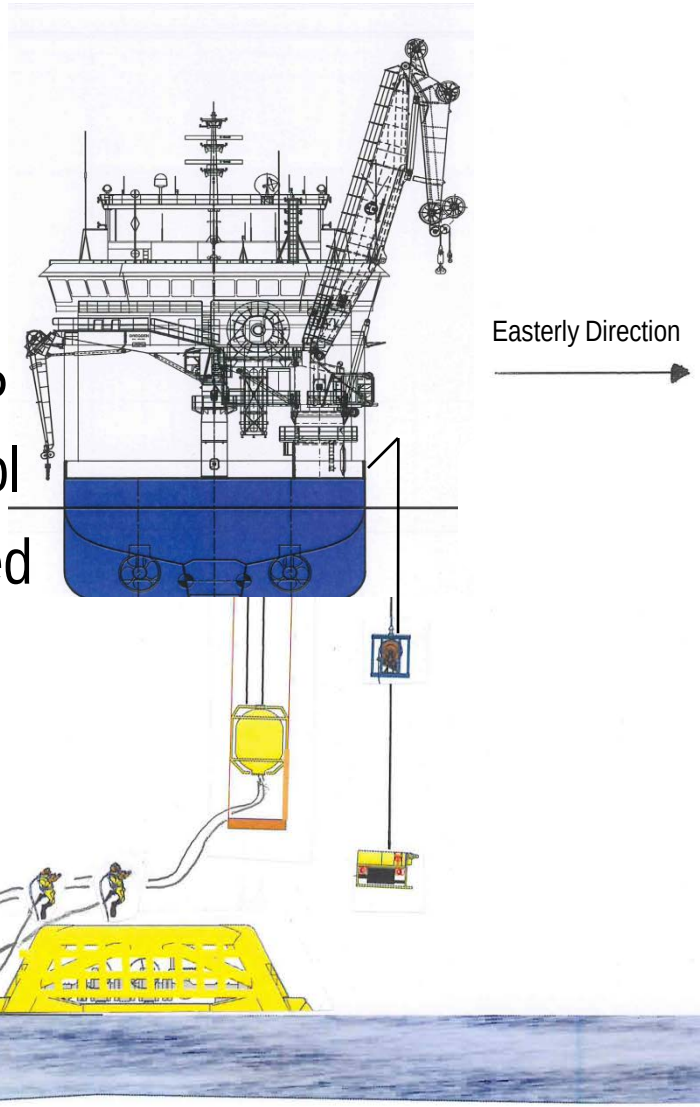
Time Line - 22.09

- Alarm for ‘RBUS’ activated
- DP amber alert activated
- Vessel starts to drift
- Master & Dive Control informed
- Dive Supervisor instructed divers to leave structure and locate to bell stage
- Attempts made to reselect thrusters into DP



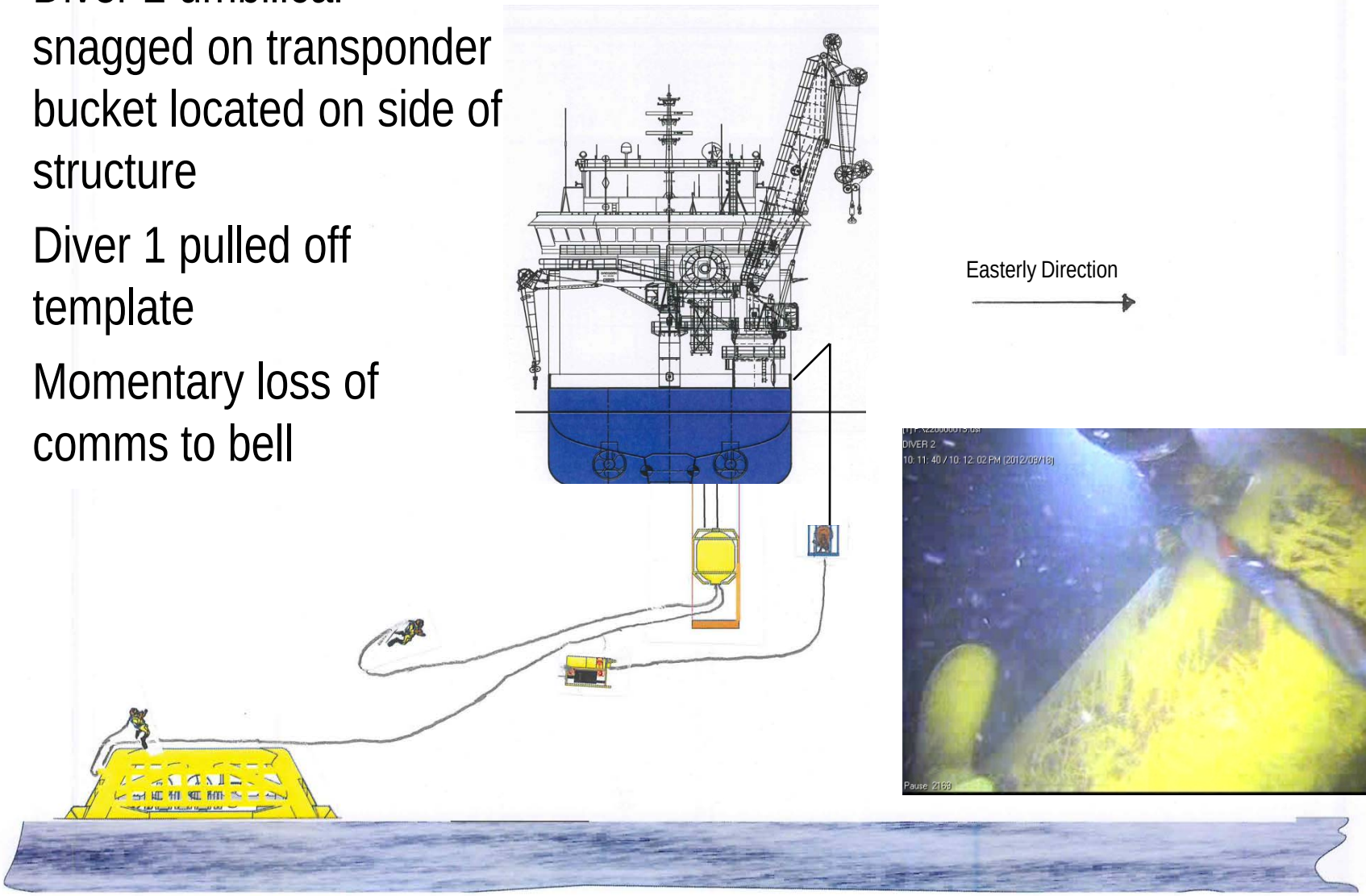
Time Line – 22.11

- DP Red alert activated
- Vessel continued drifting to East, all references & thrusters unavailable to DP
- Master switches from DP to manual thruster control
- Standby generator started with thruster 4
- Diver 1 & 2 located onto top of template



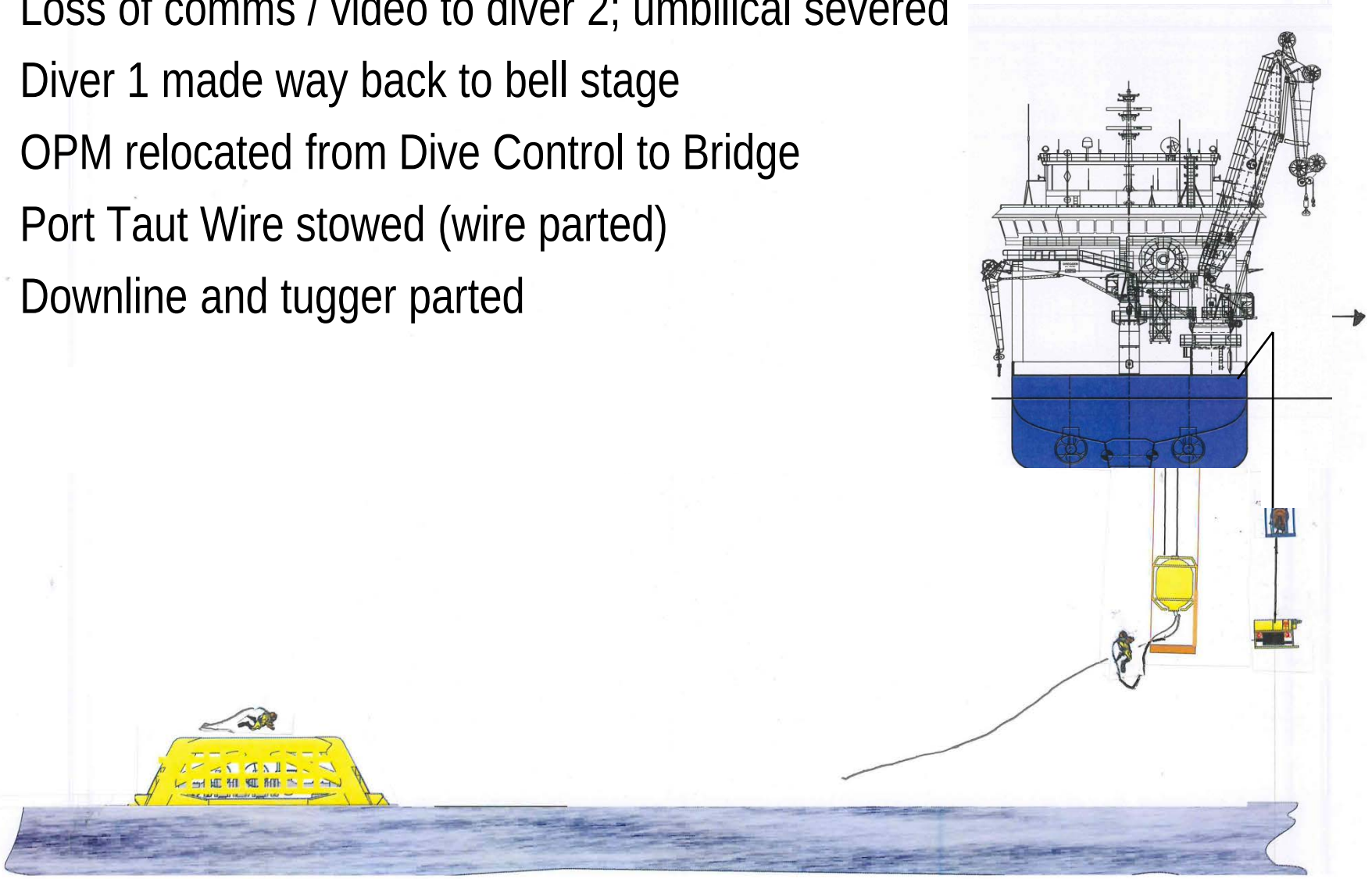
Time Line – 22.12

- Diver 2 umbilical snagged on transponder bucket located on side of structure
- Diver 1 pulled off template
- Momentary loss of comms to bell



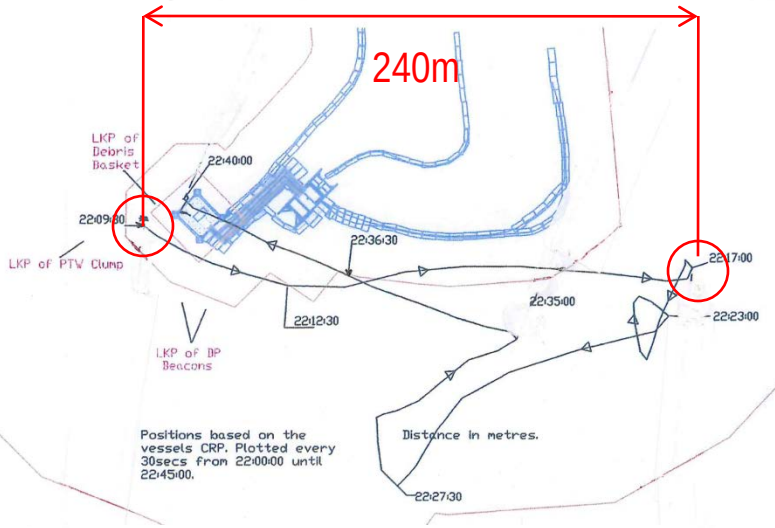
Time Line – 22.13 to 22.15

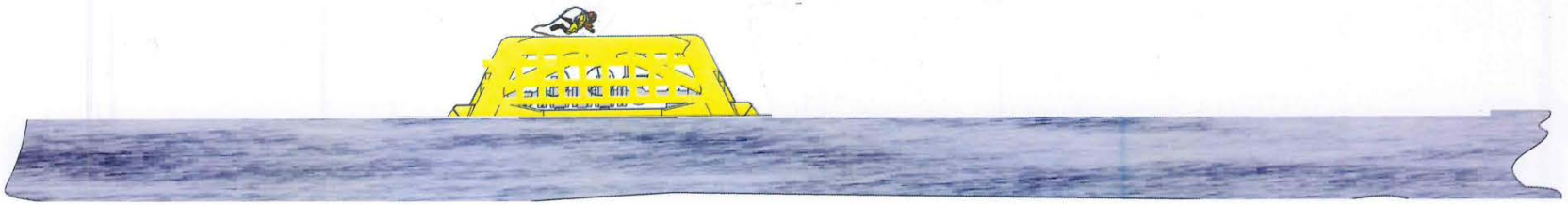
- Loss of comms / video to diver 2; umbilical severed
- Diver 1 made way back to bell stage
- OPM relocated from Dive Control to Bridge
- Port Taut Wire stowed (wire parted)
- Downline and tugger parted



Time Line – 22.17

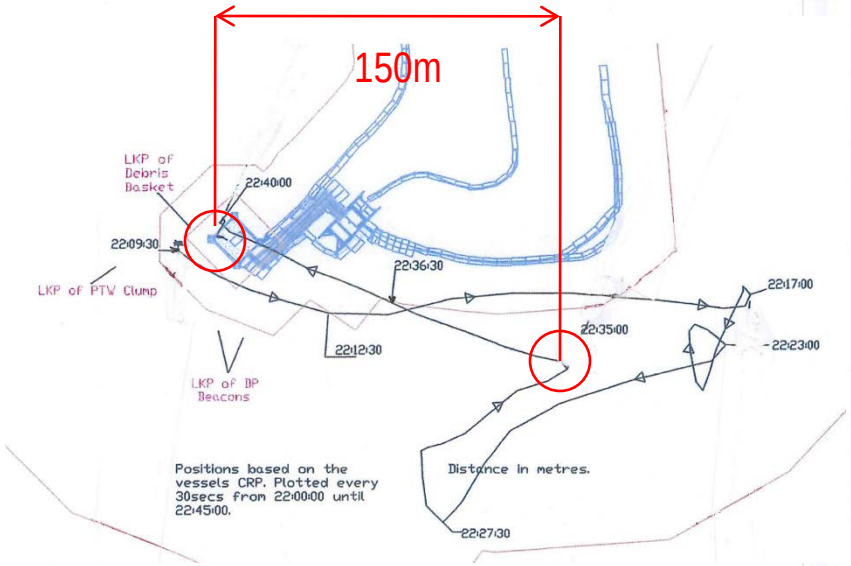
- Vessel position 240m East of Drilling Template
- Vessel being manually driven using forward and aft azimuths
- Chief Officer on thrusters 2 & 3, Master on main propulsion thrusters 5 & 6
- Diver 2 locator beacon identified to be at template

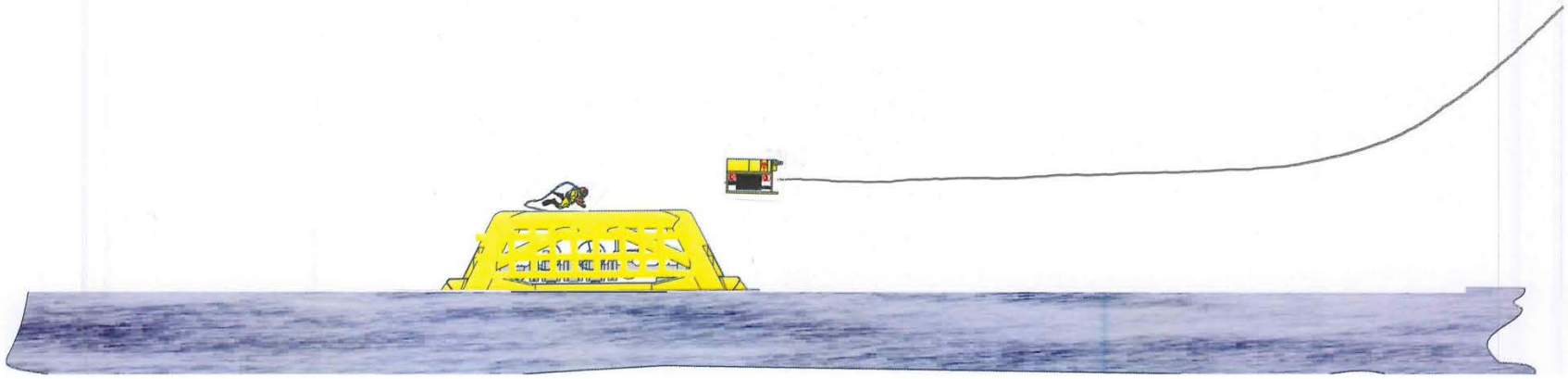




Time Line - 22.29 – 22.34

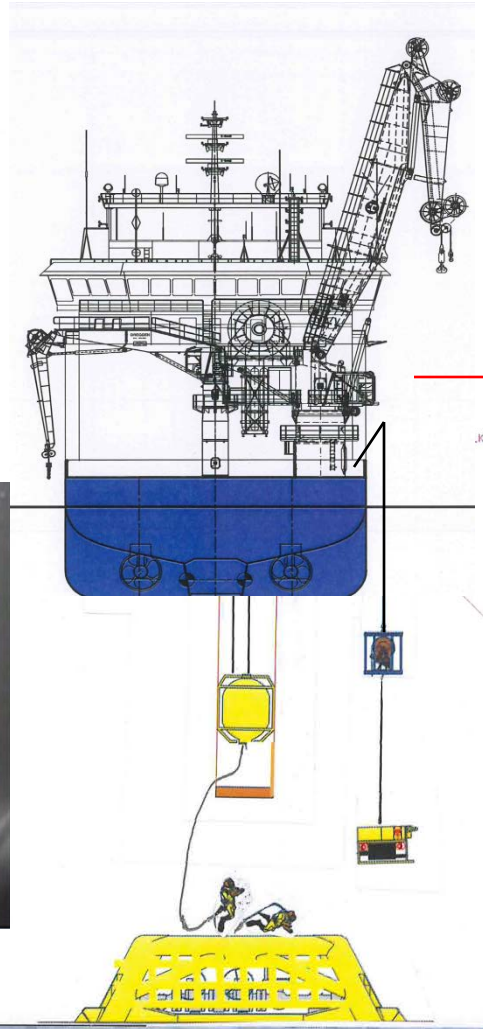
- ROV back at Drilling Template
- Diver 2 located on top of template
- DP controllers power recycled
- Vessel back on full auto DP

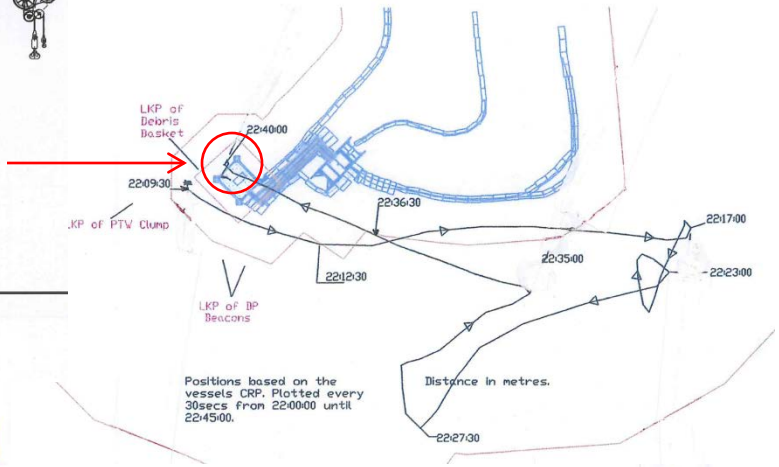




Time Line – 22.40

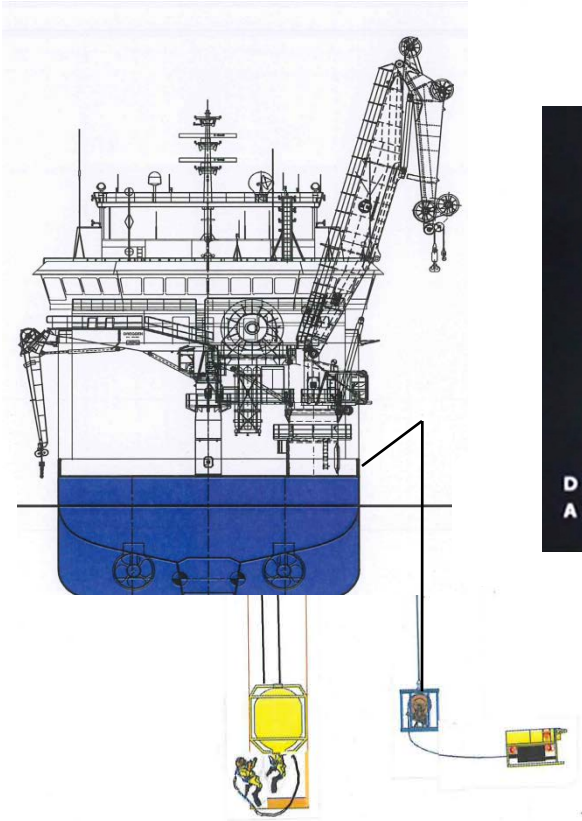
- Vessel back at Drilling Template
- Diver 1 left stage, bell 18m from template
- Recovery of Diver 2 commenced

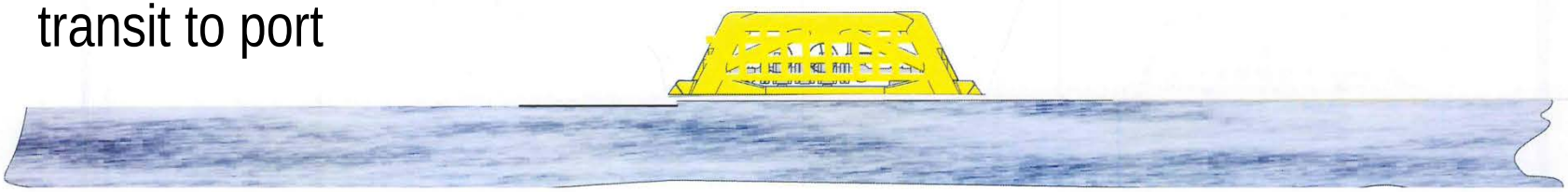




Time Line – 22.46

- Diver 2 recovered to bell, unconscious & breathing
- 23.04 Diver 2 stable, vital signs good, talking
- 23.13 Bell sealed and left bottom
- 23.38 Bell locked on
- 23.50 ROV recovered
- 24.00 commenced transit to port





Emergency Response

- OPM - Call made to ERSC
- Master - Call made to BSM
- ERSC - Call made to Duty Manager
- ERSC – Call made to BSM
- ERSC – Call made to Client
- Duty Manager – Call made to Project Manager
- Duty Manager – Call made to Snr Management
- Snr Management discussion
- Vessel made way to Port
- Snr Management meeting early morning

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Medical Treatment

- 18th 22.30 - Medic reported to dive control to assess the situation.
- 22.46 - Diver recovered back into bell, appeared to be unconscious with shallow breathing
  - Diver regained consciousness & movement of digits ; gripping hand of the bellman
- 23.15 - DMAC 15 equipment sent into chamber 1 (medical chamber) by medic; defibrillator, stretcher & neck brace in situ
- 23.38 - Diver climbed down steps from bell with assistance from the other divers
  - Diver core temp raised, fluid replacement
- 19th 00.45 - Medic contacted Capita Dive Dr; satisfied with progress

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Medical Treatment

- 02.00 - Diver stable, moved onto ½ hrly observations
- 03.00 - hrly observations commenced
- 07.45 - Dive Dr granted permission for diver to commence decompression (12 man team commenced deco)
- 15.00 - Dive Dr onboard to speak to diver; 4hrly observations commenced
- 20th 06.00 - good progress, 8 hrly observations commenced
- 22nd 13.20 - Decompression completed
  - Diver met by Dive Dr, post sat medical completed
  - Councillor available for teams
- 23rd - Further examination at Capita Health Solutions

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Vessel Assurance – DP System

- Determine the fault which caused loss of control of the thrusters along with loss of all reference & environmental signals to the DP control system
- Assess actions of personnel re change status of the DP control
- Assessment & analysis of DP alarm log / printout
- Conduct non-intrusive testing of Software & Hardware
- Interrogation of software
- Interrogation of bridge VDR
- FMEA review
- DP proving trials schedule for testing and verification of the system

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Vessel Assurance – DP System

- Vessel conducted testing on the system to try to replicate the failure, in conjunction with the testing on the switchboards; in accordance with DNV approved trials schedule .
- Able to replicate the failure of the module to provide the various alarms that were seen on the 18th
- All options exhausted in terms of testing on the vessel; DNV agreement
- Power management system testing carried out
- DP hardware replaced & existing units taken off & sent back to Norway; DNV agreement
- Kongsberg disassembling module by module to fully substantiate root cause of the failure
- DP FMEA proving trials being conducted

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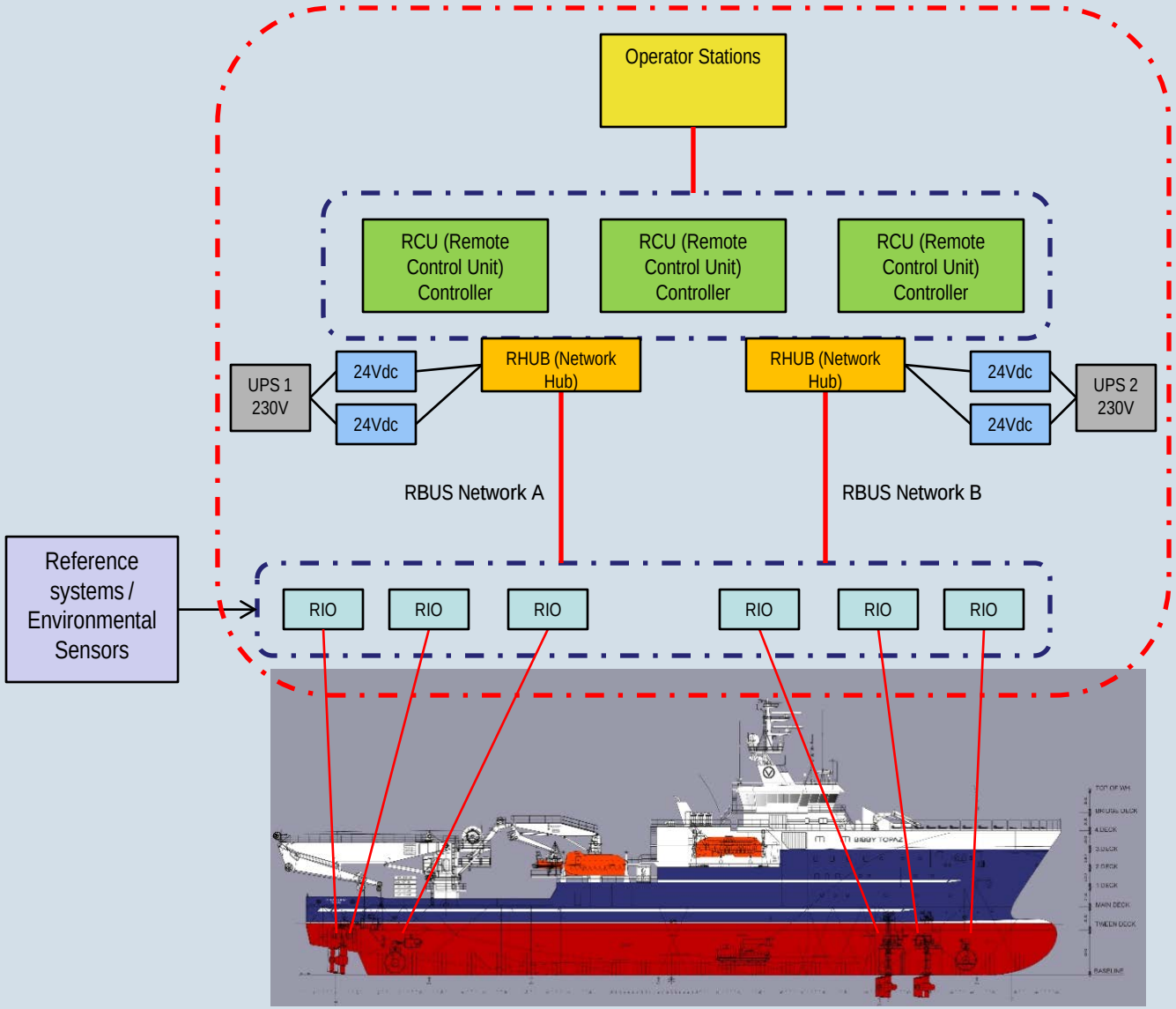
DP Control System



Controllers - Bridge DP computers

Each of the RHUB (Network Hub) has two 24Vdc power supplies

Information from the RIO Units are conveyed to the controllers via 2 dedicated RBUS Networks; A & B

Remote Input Output (RIO) units. Take all feedback from the reference & environmental sensors along with command & feedback signals for the thrusters. Each Thruster has RIO unit

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Vessel Assurance – Dive System

- Starboard main bell umbilical cables checked for insulation, continuity & resistance; no faults found.
- Starboard main bell umbilical pressure leak tested to maximum working pressure; no Issues.
- Diver 2 excursion umbilical (55mtr) quarantined & to be scrapped,
- Diver 1 excursion umbilical (55mtr) removed from service & sent to Greco Developments for checking/refurbishment (may have been subjected to a certain amount of strain & to be checked out before going back into service).
- The Diver 2 hat and neck dam still under quarantine. Require full service.

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Vessel Assurance – Dive System

- Diver 2 bail out and harness still under quarantine; strap & back plate replaced
- Diver 2 umbilical horns inside Starboard bell removed & straightened; bent slightly due to the pull that had been put on it when the umbilical was snagged, before it eventually parted.
- Bell wires have been cut back and re-terminated & load tested
- Guide weight wires have been cut back and re-terminated & load tested
- All excursion umbilical 6 monthly testing has been completed.
- The Stbd tools winch wire was parted in the incident; replaced

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Lessons Learned

- Conduct engagement sessions with internal & external stakeholders
- Share incident and lessons learned with industry; IMCA, OGP, Subsea UK, Stepchange
- Initiate project to look into enhancement of diver safety using experiences from this incident
- Review FMEA / FMECA documentation
- Review emergency response & contingency planning process, procedures, drills, exercises
- Review media liaison arrangements

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