IMCA DP Station Keeping Bulletin 01/19

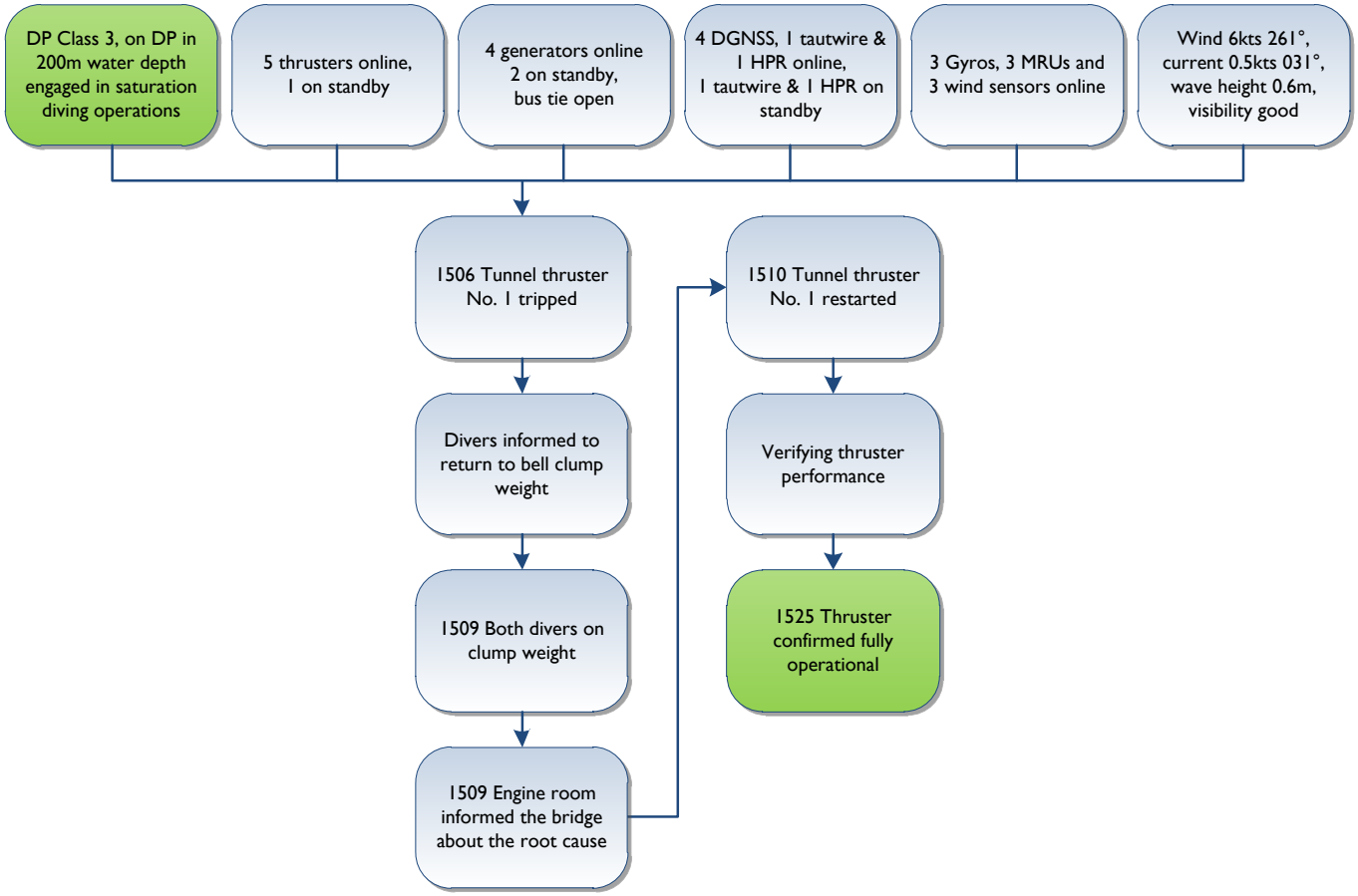
February 2019

The following case studies and observations have been compiled from information received by IMCA during 2019. To ensure anonymity all vessel, client and operational data has been removed from the narrative.

Vessel managers, DP operators and DP technical crew should consider if these case studies are relevant to their own vessel DP operation so that they can be used to assess and assist the safe operation of the vessel.

Any queries regarding this bulletin should be directed to Andy Goldsmith (andy.goldsmith@imca-int.com), IMCA Technical Adviser – Marine. Members and non-members alike are welcome to contact Andy if they have experienced DP events which can be securely analysed and then shared anonymously with the DP industry.

Event 1: Loss of Tunnel Thruster – DP Undesired Event



Comments from the report:

During diving operations in open water, tunnel thruster No. 1 tripped offline. Investigation showed that the cause was due to tripping of the thruster hydraulic pump because of voltage instability. The voltage instability was caused by a spike load on an unrelated circuit breaker on the same switchboard which tripped. Because of the voltage drop on starboard 690V switchboard during the event some of the equipment breakers opened on under voltage:

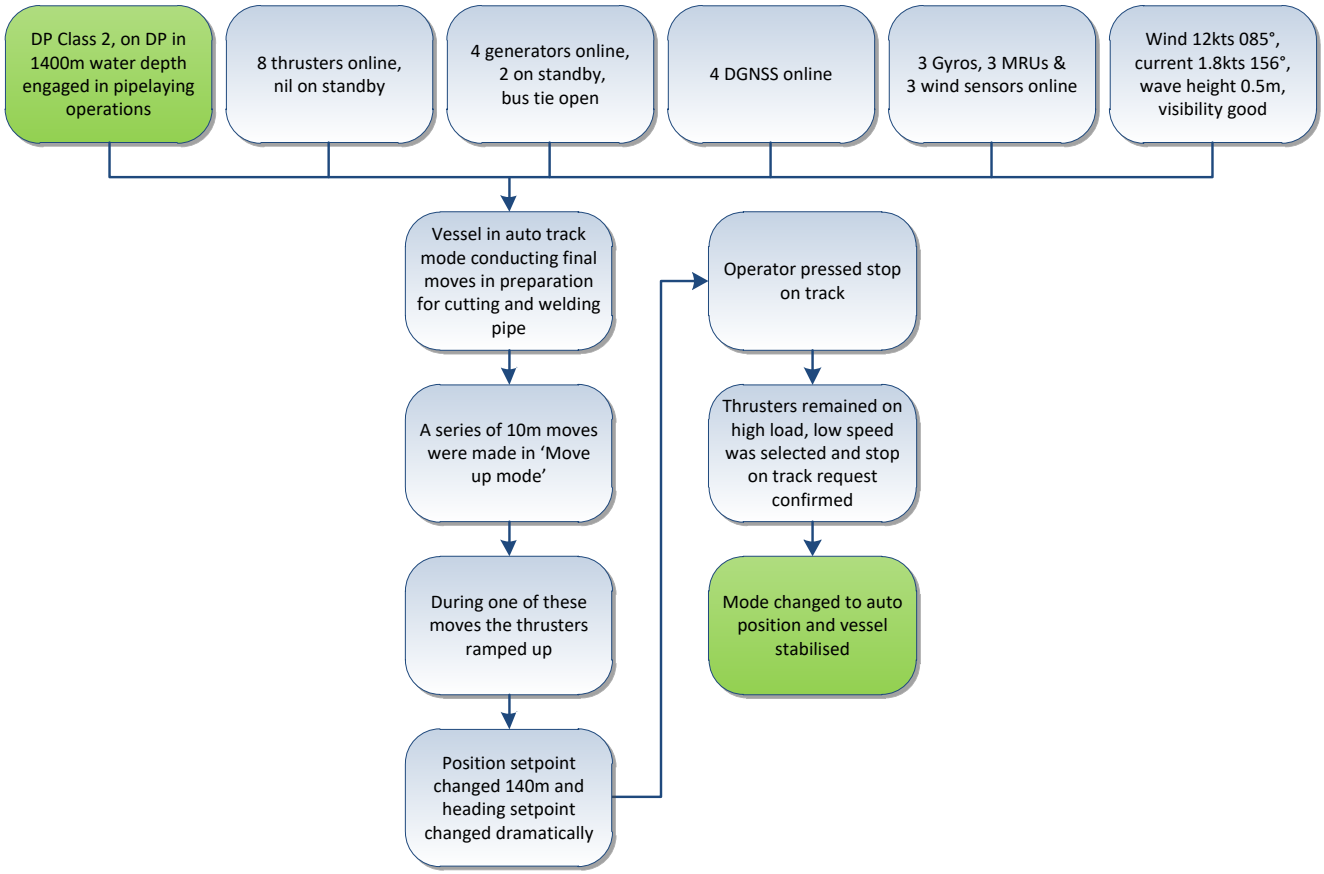
- Tunnel Thruster No. 1 due to power drop to hydraulic pump and signal command “External Shutdown” from controller to frequency converter drive.
- Starboard ER fans.

The vessel maintained position throughout the event.

Considerations of the IMCA Marine DP Committee from the above event:

- This event highlights how unrelated equipment failure can have an effect on DP system equipment and therefore the vessels redundancy concept and needs to be considered during failure analysis.
- It is assumed that redundancy was not compromised by the tripping of the tunnel thruster and therefore it was not necessary to initiate a DP amber alert.
- It is not good practice to have 4 DGNSS selected to the DP controller, this could result in rejecting other selected systems if the DGNSS were to drift due to a common satellite problem.
- The root cause should have been identified and isolated from the 690v switchboard before the thruster was re-enabled.

Event 2: Specialised Pipe Laying DP Mode – DP Undesired Event



Comments from the report:

When the vessel was confirmed stopped and on the setpoint, the operator checked the auto track setting to find the cause of the track change. Upon checking, it was verified that the 'waypoint for radius turn' had changed to 'operator' a pre-set value of 200m; the vessel standard setting is 'waypoint table'. The operator reselected 'waypoint table' and the previous barge track was displayed.

During investigation, the vessel crew were able to recreate the failure. Since the incident occurred the log files have been forwarded to the DP system manufacturer for review. The conclusion is that the issue is specific to move-up mode.

Initiating event

The position setpoint changed dramatically to about 140m, heading setpoint also changed to 14 degrees and thrusters started ramping up. This was due to a dramatic change of barge track

Main cause

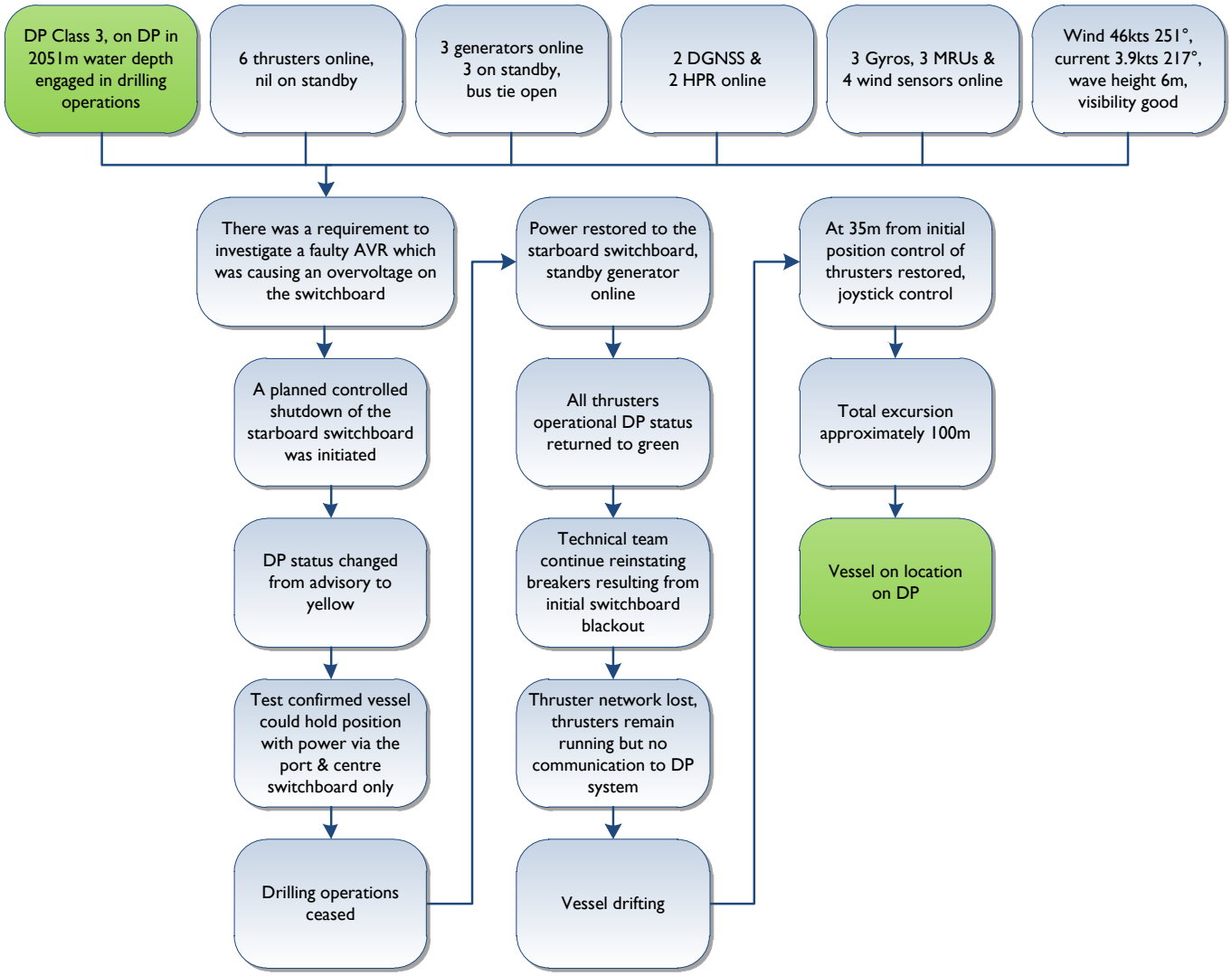
The barge track changed from a waypoint table selected radius of 1828m to 'Operator' selected of 200m.

Considerations of the IMCA Marine DP Committee from the above event:

It appears the DP system manufacturer responded well to this event.

The selection of "operator specified turn radius" (radio button selection) should be inhibited and "greyed out" when vessel is in a turn while move-up sub mode is active. This inhibit function was not activated when the dialog box was opened again after the "auto – turn – move up" function had been activated. Four conditions have to be aligned for this to happen. The "move-up" mode was introduced in 2002 and this is the first time this was reported to the original equipment manufacturer. So, the MTBF is 15-years but of course the consequence could be damage to the pipe. A software modification has been made, installed and tested on this specific vessel. The global customer support team have a process in place to go through all software releases which have this function and update the vessels that are affected during next service visit.

Event 3: Planned Investigation Resulted in DP Incident



Comments from the report:

An AVR problem in diesel generator No. 1 engine caused an over voltage in the system. Due to increased voltage, the standby machine could not be brought online, and the switchboard required a controlled blackout. After this, many alarms from Network B were observed due to the supply being interrupted. An hour later, there was a total loss of network communication affecting many field stations together with loss of DP communication to all thrusters, which caused the vessel to drift off. The probable cause was accidentally resetting network A, when trouble shooting of network B was taking place.

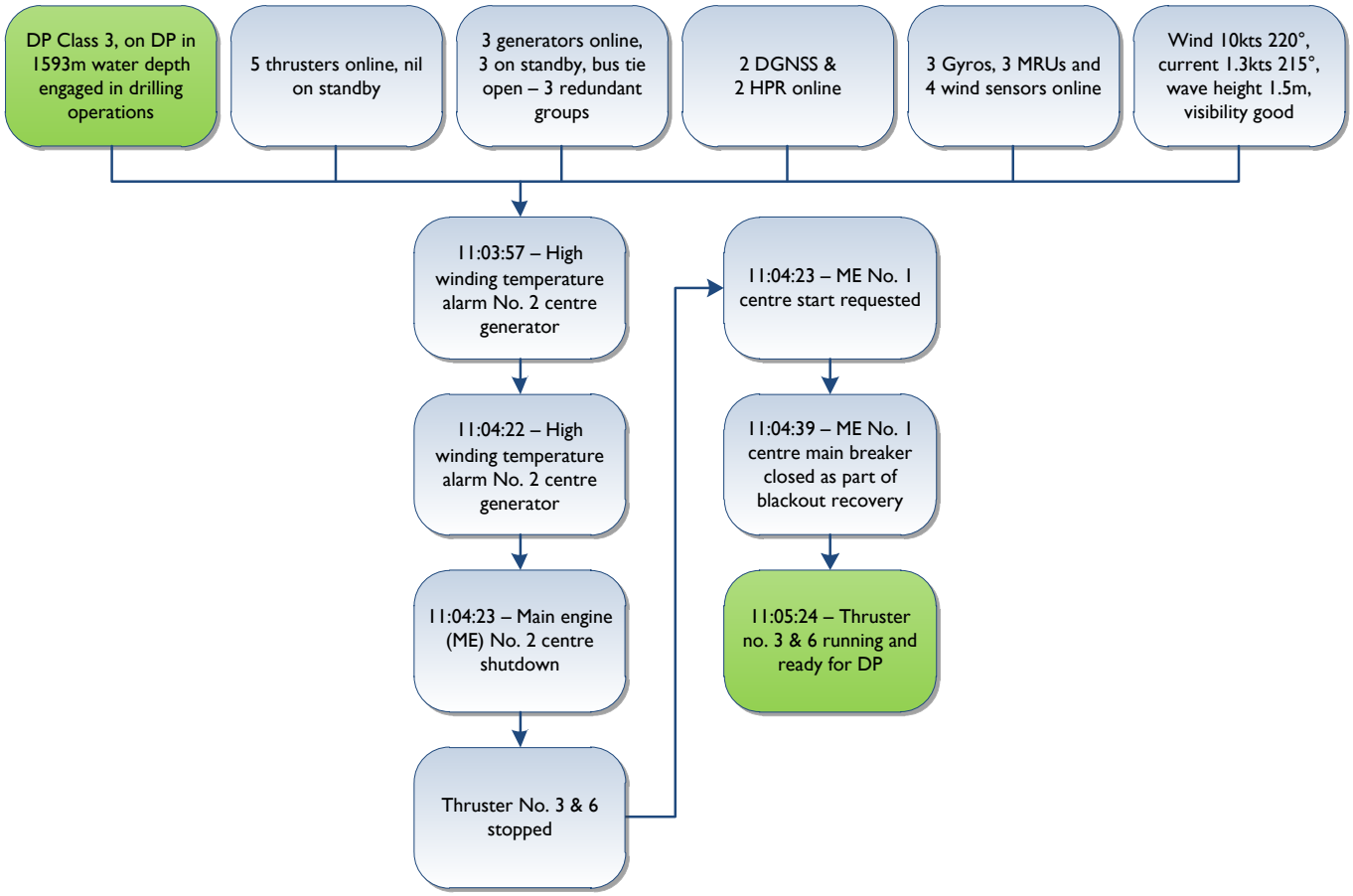
Further investigation of the overvoltage issue found a 3-phase breaker was faulty to engine No.1; the breaker was replaced by an onboard spare. The DP system manufacturer concluded that the vessel was operational as designed, indicating a possible human mistake by rebooting network A.

Considerations of the IMCA Marine DP Committee from the above event:

The vessel instigated a DP yellow alert whilst a fault was investigated. Considering the weather conditions and nature of investigation the vessel should have either abandoned operations or been fully prepared to do so.

Given the circumstances, it is evident the vessel returned to normal operations too quickly and whilst reinstatement of the system was still in progress. The root cause of the incident was not given in the report, but it is evident that work involving the resetting of the network caused the loss of DP communication with the thrusters and subsequent position excursion. While total network failure and subsequent drift off represents a DP incident, the initial failure of the AVR only represents an undesired event.

Event 4: Loss of One Redundant Group – DP Undesired Event



Comments from the report:

A partial blackout of the centre high voltage (HV) switchboard at 11.04am caused by No. 2 generator. This caused the loss of the 440V distribution board and thrusters No. 3 & 6. The centre generator No. 1 started and connected onto the switchboard, there was no loss of power to the drill floor as this is fed from both port and starboard HV switchboards. The power management system worked as expected, investigation found a poor connection to the temperature sensor of No. 2 generator causing the temperature fluctuation.

There was no loss of position.

Considerations of the IMCA Marine DP Committee from the above event:

- With the loss of one redundant group DP amber alert should have been activated.
- The system reacted well to the loss of the centre switchboard however it was felt worthwhile to highlight the configuration in this case. The vessel was operating with one generator on each of the three switchboards. Therefore, it was accepted that if one generator failed then one redundant group would be lost.
- It is important that DP personnel are fully aware of the situation and recognise that there could be a degree of risk as the switchboard is brought back on line.