



## Vessel loss of position while diving in close proximity to a hydrocarbon facility

### What happened?

Recently a vessel facility undertaking construction activities had an unplanned movement while diving activities were being conducted approximately 130 metres from a hydrocarbon facility. The loss of position was caused by a deactivation of the forward/aft automatic positioning function by unintentionally deselecting the 'surge' button on the DP (Dynamic Position) console located on the bridge (Image 1 & 2) which then deactivated the 'Auto Position' mode. The deselection was thought to have occurred by the placement of a notepad on the side of the console. The vessel drifted off location by over 40 metres and this drift was initially noticed by a diver when his umbilical started to become taut.

Once the DPO (Dynamic Position Operator) became aware of the excursion, the 'Auto Position' mode was reactivated causing the vessel to stop moving and remain in position. During this time, the diver had followed his umbilical, moved clear of any obstacles, and walked with the vessel.

Image 1 – DPO workstation



Image 2 – Inset of DP console ('Surge' button circled)



### What could go wrong?

A loss of position during diving could cause diver fatalities if their umbilicals or other equipment becomes entangled or snagged on subsea infrastructure during the excursion. A loss of position whilst working in close proximity to a hydrocarbon facility could also potentially cause a collision, leading to a loss of hydrocarbon containment and subsequent fire or explosion. In both cases the consequences could involve multiple fatalities.

### Investigation findings

Due to the potential severity of the consequences of this incident NOPSEMA directed its inspectors to investigate the incident by conducting an OHS inspection on board the facility (independent of the facility operator's own investigation). NOPSEMA's investigation identified that the auto DP mode buttons (Surge, Sway and Yaw) were located in the left hand corner of the console next to desk space commonly used for completing DP related checklists and logs. Consequently, these buttons were susceptible to accidental activation by personnel.

The inspectors found that although the incident arose by an accidental and unknowing double press of a button by the DPO, the design of the DP system allowed a human error to escalate this act into a dangerous



occurrence by neither requiring any positive confirmation of deactivation of 'Auto Position' mode nor providing any alarm that required acknowledgment that 'Auto Position' mode had been de-activated. The situation was exacerbated and recovery impeded as deselecting the 'surge' button automatically deactivates the excursion alarms in that axis and the DP display was no longer providing useful feedback in terms of the loss of position event as the excursion rings started to track with the vessels movement.

If either of the controls identified above were in place, it is unlikely the incident would have escalated to a loss of position event. In order to rectify the issue the operator, with assistance from the manufacturer, are currently upgrading the control systems software to provide a separate dialogue box confirmation requirement when deactivating the 'Auto Position' mode.

### Key lessons

- Control system interfaces should be designed to account for foreseeable human error. Adequate control measures to prevent and recover from errors should be in place.
- For DP vessels, operators need to ensure that suitable controls are in place to prevent a single inadvertent act from leading to a loss of position.
- Double press activation for switches with safety critical functions may not be an adequate barrier to prevent an inadvertent action. More robust methods need to be considered.
- DP systems can prevent inadvertent operator selection in several other ways including operation of two separate selection devices and using screen based question pop-ups.
- Monitoring tasks are not a human strength; hence control panel operators are heavily reliant on control systems to provide alerts of any unsafe operational conditions, to allow them to problem solve the issue (which is a human strength). Good control system design should account for this.
- Switches with safety critical functions should be positioned to avoid accidental activation/deactivation that could cause an unsafe condition.
- Facility operators need to ensure that lessons are learned from previous incidents and any additional controls suitably communicated to the workforce. In this case, the vessel had a similar human error induced loss of position event in 2009.

### The legislation

- Facility operators have a duty of care to take all reasonably practicable steps to ensure equipment at the facility is safe and without risk to health (Clause 9, Schedule 3 to the *Offshore Petroleum Greenhouse Gas Storage Act 2006*).
- Manufacturers of plant, including control systems, must take reasonably practicable steps to ensure that the plant and equipment is so designed and constructed as to be, when properly used, safe and without risk to health and safety. (Clause 12, Schedule 3 to the *Offshore Petroleum Greenhouse Gas Storage Act 2006*).

### Contact

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