



Understanding of light well intervention safety systems is critical for safe operation

Key message:

It is critical that facility operators and relevant members of the workforce fully understand the Light Well Intervention safety systems installed on their vessels, have an in-depth knowledge and understanding of the system's safety features and functionality, and know how the equipment will behave in abnormal conditions.

What happened?

Recently, the failure to fully understand a light well intervention safety system's functionality caused an incident which resulted in two 1.6kg dropped objects.

At the time of the incident, the vessel was in the process of recovering equipment from a well at a water depth of 200 metres. A winch guide wire was attached subsea and a 2-inch service hose was attached to the wire using clamps. The winch was set in the active heave compensation mode when a fault occurred on the winch which activated the winch brakes and deactivated the heave compensation system. An alarm sounded briefly and displayed on the control console however the fault remained undetected for approximately 30 minutes.

During this time, the wire detached subsea due to the load applied by the heave and movement of the vessel. Once the fault was finally detected, and believing the wire was still attached subsea, the console operator reset the winch system and slowly increased the winch tension. No visual check, using the ROV, was completed to ensure the guide wire was still attached.

The 2-inch service hose, which remained connected to the subsea stack, is believed to have stretched under load, reducing friction with the clamp and leading to a rapid retraction of the wire by approximately 20 metres before the winch shut down on over-speed and the wire came to a halt. During the retraction of the wire, the upper two clamps collided with the sheave at the top of the tower on the vessel and parted; one of which dropped 27 metres to the deck below.

What could go wrong?

Failure to appropriately verify and fully understand how safety critical systems operate can lead to unexpected consequences; in this case resulting in two dropped objects, one of which could have caused a fatality if it had struck a person.

Why did this happen?

NOPSEMA's investigation into this incident identified that:

- The winch system's commissioning procedure did not verify the system's automatic response to a winch fault.
- Multiple revisions of the winch manual were on-board which detailed differing automated safety system responses to a winch fault.
- Tower personnel believed the winch brakes would not engage immediately on detection of a winch fault during active heave compensation.
- The display panel on the control console detailed that the winch brakes would not engage on detection of a winch fault during active heave compensation, however, the system was actually configured to apply the brakes immediately.
- The console operator was not adequately alerted to the winch fault by the control console, which delayed the initial response to the fault. The audible alarm was not ideally positioned for hearing and only beeped twice before becoming silent. The main display of the control console only showed the latest alarm, while all previous alarms could only be accessed by opening another display window.

- There was no formal requirement to check that the winch wire had not parted subsea prior to the re-tensioning of the wire.
- The facility operator did not identify secondary retention of the hose clamps as a control in the hazard identification (HAZID) or Toolbox talk for the activity. Both the HAZID and Toolbox talk did not identify the risk of rapid winch retraction in active heave compensation mode.

Key lessons

Commissioning of safety-critical equipment systems should include verification of all safety features including actual configuration.

Facility operators need to ensure safety-critical system manuals are controlled and up-to-date.

Manufacturers need to ensure manuals related to safety-critical equipment have a robust quality control process to ensure the information they contain is accurate.

Facility operators need to have a clear process for alarm management to ensure suitable responses.

Alarm systems should be designed to effectively alert the console operator of any faults and provide the necessary information to allow the operator to respond in a timely and appropriate way.

Toolbox talks should provide a clear breakdown of the individual tasks for the activity, and identify the risks and controls specific to each task.

Secondary retention should be considered for all equipment (including temporary project related equipment) to be used at height and having the potential to cause harm.

Image 1: Damaged dropped clamp



Image 2: Secondary retention subsequently fitted to the guide wire clamps



The legislation

Schedule 3 of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* places a general duty on the operator of a facility to take all reasonably practicable steps to ensure that all work and other activities carried out on the facility are carried out in a manner that is safe and without risk to the health of any person at or near the facility.

Contact

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