

## 2017- J: Gas leak during valve testing

On a floating production unit, periodic testing of pressure/vacuum valves (PVVs) on slop and cargo tanks was carried out. A permit to work and job safety analysis were prepared, and the job was discussed during the daily work coordination meeting - as normal. Prior to initiating the work, a toolbox talk was performed in the control room to discuss the work and the required preparations and conditions. The wind speed (> 17 knots required) was verified to be OK for the work to be performed. Optimal heading for weather vaning was discussed, and it was agreed to take the wind 20-25 degrees on port bow. After the tool box talk, the field operators activated the permit to work and the central control room marine operator positioned the floating production unit. The field operators received confirmation from the control room operator that the conditions were as agreed, and initiated testing of PVVs at crane cradle number 1. When this testing was completed, they started testing the pressure/vacuum valves at the aft PVV platform starboard. Four PVVs were tested according to plan. During testing of the vacuum side of one of the valves, the vacuum disc on the vacuum side of the valve got stuck in open position. It took about 10 seconds before the operator was able to manually close it again. An estimated amount of 4 kg gas was released. The gas was taken by the wind (probably turbulence caused by structures in the area) to the air intake to the inert gas generator. 100% of lower explosion limit was detected on both gas detectors in the air intake, and an ESD2 (emergency shut down level 2) was triggered. The general alarm was initiated and personnel mustered. When the ESD2 triggered, the field operators left the area. The control room operator communicated with the field operators via radio and asked one of them to go to the inert gas generator room to check if there was gas inside the room. When there, the operator confirmed that there were no indications of gas in the room. The recorded gas levels on the two detectors in the air intake went quickly back to zero level. The search and rescue team also confirmed that the area near the air intake and inert gas generator room were OK. After discussing the situation the platform management agreed to start normalizing and restart production.



Figure 1 Left side: Pressure/vacuum valves (PVVs). Right side: Tap (full stroke check lift) considered to be modified.

## Causes

### Direct cause

- The vacuum disc inside a pressure/vacuum valve (PVV) got stuck in open position during testing.

### Underlying causes

- Operational issue probably not identified as a potential problem during design.
- Template for the job safety analysis and testing tools to lift the vacuum disc needs improvement.
- The PVV replacement frequency has decreased from 4 years to 5 years.

## Lessons and recommendations

- Evaluate to install isolation valves upstream PVVs that can be closed during preventive maintenance.
- Discuss with supplier if the design of the tap (full stroke check lift) can be modified to prevent the tap to be inserted all the way into the valve (easier to pull out if vacuum disc is stuck open).
- Update the template for the job safety analysis to include
  - Stop the ventilation fans to the inert gas generator room during testing.
  - Temporarily restrict nearby area to prevent personnel exposure.
  - Evaluate to block detectors in the immediate area (detectors that deteriorate the integrity of the safety system should not be blocked).
- Evaluate if alternative tools can be used to move the tap on the vacuum disc. For example use some type of screw mechanism (ters) to control the force and movement of the tap.