

Incident description: gas leak 2016

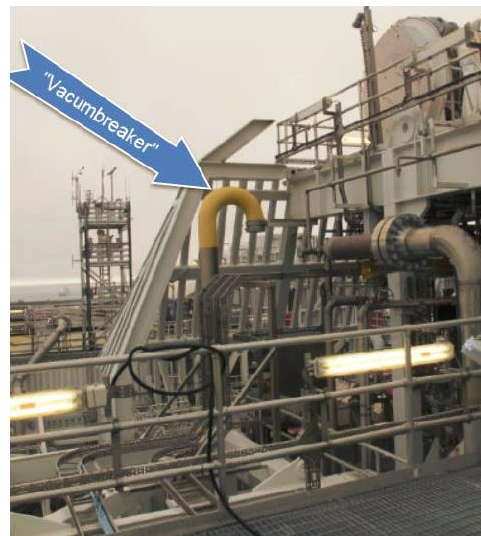
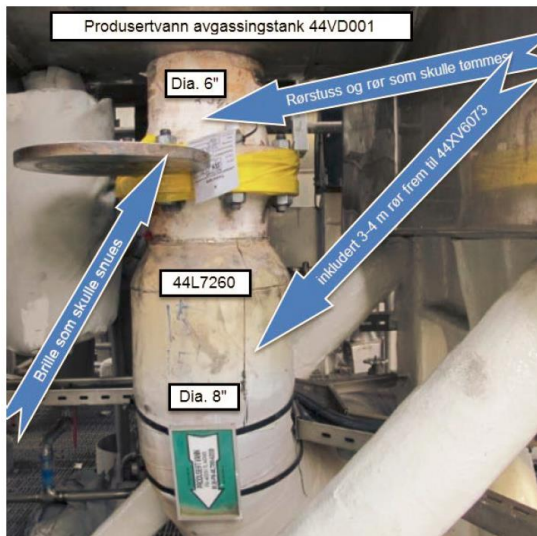
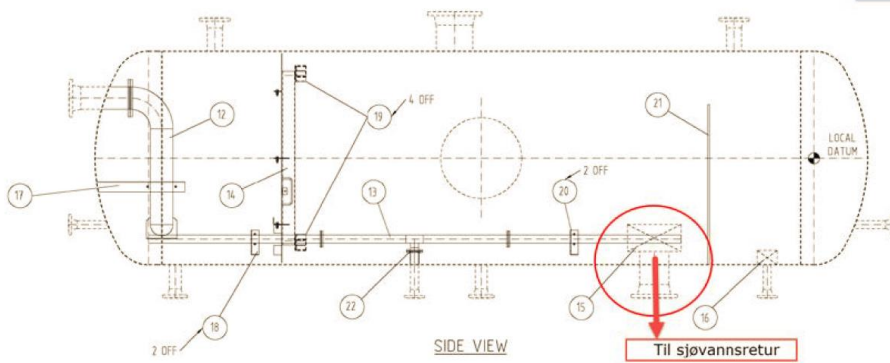
In connection with preparing for a maintenance shutdown, a number of tanks and separators were to be drained for entry and inspection. These included a degassing tank for produced water. A general plan based on gas blowby was drawn up for fluid drainage and readying. This involves using process gas to blow fluid out of a tank, either to the next tank or to a closed drain. The degassing tank for produced water was the last tank in this process, and the bulk of the fluid had already drained to the closed drain pursuant to the drainage plan. This plan called for the degassing tank to be drained to a closed drain in the same way as the preceding tanks. When the area technician reached the site, however, a short length of pipe was discovered which had to be drained in order to open a spectacle blind. An opportunity was available for draining the relevant segment to a closed drain, but this had not been included in the drainage plan prepared in advance. As a result, the blind had not been turned to the open position ahead of the drainage routine. The minimum required to turn the blind on the seawater return line was to drain the pipe spool between blind and tank, including three-four metres of piping. This had not been noticed in the planning.

On the basis of the above, it was decided that the simplest approach would be to use an alternative procedure – draining the connector via the seawater return line rather than the closed drain. The central control room (CCR) was instructed by walkie-talkie to open two valves in order to drain the remaining produced water to the seawater return line with the aid of gas from the process plant. The area technician positioned himself by the valve to listen for gas blowby. This is a method used with all separators and tanks in order to ensure that fluid has been fully drained. However, the difference in this case was that the outlet went directly to the seawater return line rather than the closed drain. The CCR increased the pressure in the tank to about two bar, and then opened the control valve by roughly 40 per cent. The CCR technician observed almost immediately that the pressure fell and understood the pipe spool was empty of fluid. He then shut the valve at once. However, the valve took a long time to close, so that gas continued to flow to the seawater return line for about 40 seconds after the closure signal had been given. This resulted in the seawater return line containing so much gas that an overpressure developed and the gas was blown out through the vacuum breaker. This line normally contains large fluid flows/underpressure, but two of the three seawater pumps had been stopped because of the shutdown preparations. This meant that underpressure in the line was lower than in normal operation.

Communication between those doing the job was affected because nobody was giving attention to the risk of a gas leak via the vacuum breaker and because no detailed procedure was available for draining the tank or the produced water outlet to the seawater return line. Nor was a risk assessment conducted when a pipe spool was discovered which needed draining in an alternative way.

Because of an earlier incident (in 2001), emission directly to the air via the seawater return line and the vacuum breaker was known to be a possibility. However, this was not picked up when planning the drainage job in 2016.

The initial leak rate is put at 0.5kg/s. The leak lasted for two minutes and totalled 60kg.



Causes

Direct cause

- The control valve stayed open for too long in relation to the fluid level and pressure in the tank.

Underlying causes

- Insufficient ongoing risk assessment in relation to changes in the general procedure.
- Inadequate communication between personnel doing the work.
- No detailed procedure for the drainage job.
- Insufficient risk assessment in relation to draining the pipe spool to the seawater return line.
- Drainage of the pipe spool to the seawater return line was not in the detailed planning.
- Inadequate experience transfer/updating of governing documentation.

Lessons and recommendations

- Gas blowby is not an appropriate method for draining liquid to the seawater return line.
- Assess the location of the vacuum breaker, since HC gas can escape from it in certain conditions.
- Ensure experience transfer to other units.