

Incident description: Condensate spill 2014

The incident happened due to drainage of the production plant and preparation for turnaround. The process plant was depressurised. Closed drain tank was overfilled and condensate went through the spill line from the drain tank to the area/sea. Vaporised condensate activated the gas detectors in the area.

The level measuring device measures the pressure from the liquid in the tank (the weight of the liquid column) and transforms this value to liquid level (in meters). The level measuring device was calibrated for water. A certain amount of condensate is accounted for, but when the water/condensate ratio changes, there will be level measurement errors. The density of condensate is lower than for water. In this case, the amount of condensate was increased, and the indicator showed a liquid level lower than the actual level.

Between 300 and 1500 litres of liquid (mainly condensate) leaked out of the tank during a short period (ca. 7-10 minutes). It is assumed that a certain part of this hit the piping/structure and also was vaporised before hitting the sea. The actual oil leakage was estimated to < 1000 litres (1m³). The gas leak rate (vaporised condensate) is calculated to 0,1-1kg/s.

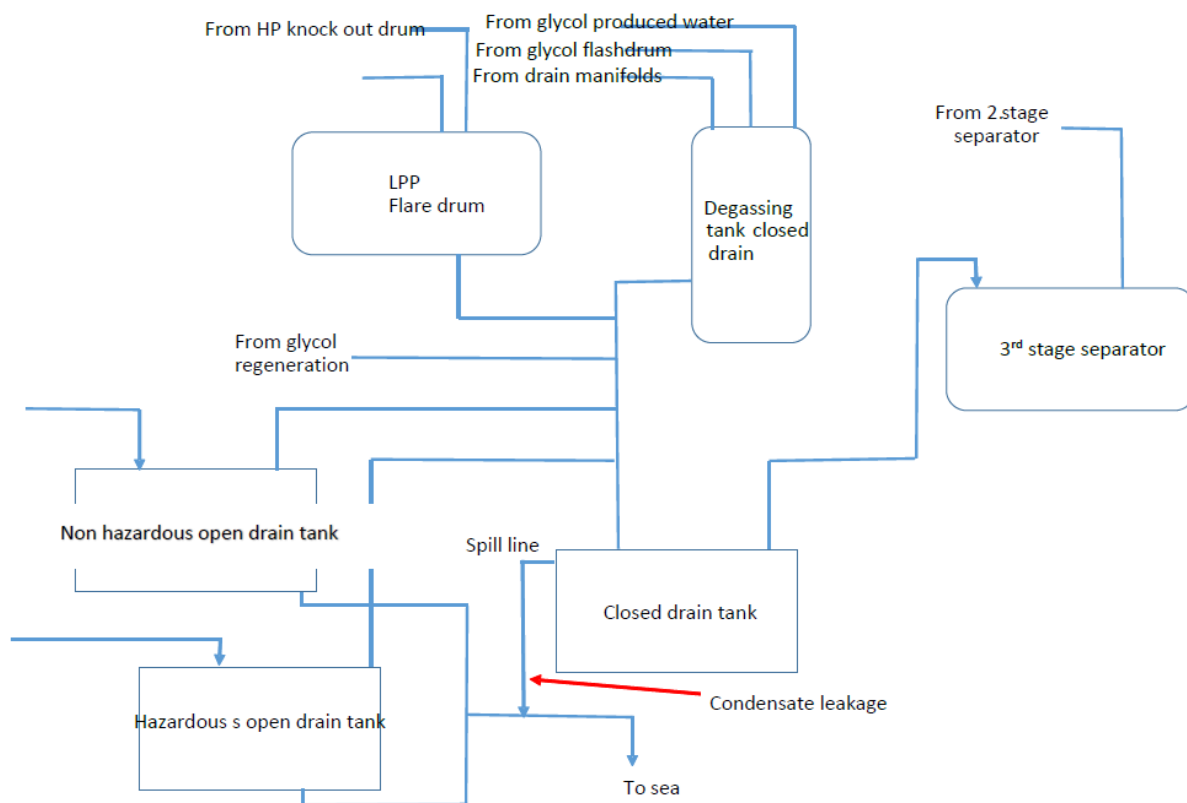


Figure1: Sketch of closed drain system

Causes

Direct cause: The level measuring device in the closed drain tank was pressure-based and calibrated for water. When the liquid level in the tank increased, and the water/condensate ratio changed, the level transmitter gave the wrong value.

Root causes:

- The problem with errors in the level measurement was known, but it was not followed up (registrations of problems with calibration of the level measurement was noted in both 2012 and 2013).
- Delays due to a earlier power failure may have led to more simultaneous drainage operations than was originally planned for going on in the period before the incident (the investigation has not found any relation between the delay and this incident).
- The original design did not include larger amounts of condensate in the tank.

Learning points and recommendations:

- Short term: Consider to change the levels for the «high high» alarm and pump start/stop to account for larger amounts of condensate in the tank.
- Change the principle for level measurement, such that the measurement records the actual level of the liquid surface in the tank independently of the liquid density in the tank (ref. NORSOK P-002 Process System Design, Section 8.1.2.4 Level Instrumentation).
- Ensure follow-up of learning points from previous events.