

Description of incident: Gas leak 2014

A well that had been shut in for approximately 4 years due to sand was started again. The well flow was routed from the test manifold to the sand cyclone unit for removal of sand before it was led further to the test separator. The sand cyclone unit was contracted from a vendor as temporary equipment, and had been onboard for approximately 1,5 years. The vendor operated and maintained the sand cyclone unit that was connected to the test manifold through permanent valves.

The well produced significant amounts of sand to the sand cyclone. The sand cyclone was drained several times during the period the well was in operation. After the 5th drainage on the same shift, the tank was going to be pressurised with well flow that had been through the parallel cyclone, and cleansed of sand. In accordance with procedure and design, the pressure equalisation line (10 mm instrument tubing) was used for pressurising. The tubing had a geometry with three 90° bends. When it was opened for flow in the tubing, a hydrocarbon leak arised due to erosion in two of the three bends. See the figure below.

The leakage was estimated to 0,65 kg/s and total leaked volume was estimated to 600 kg.

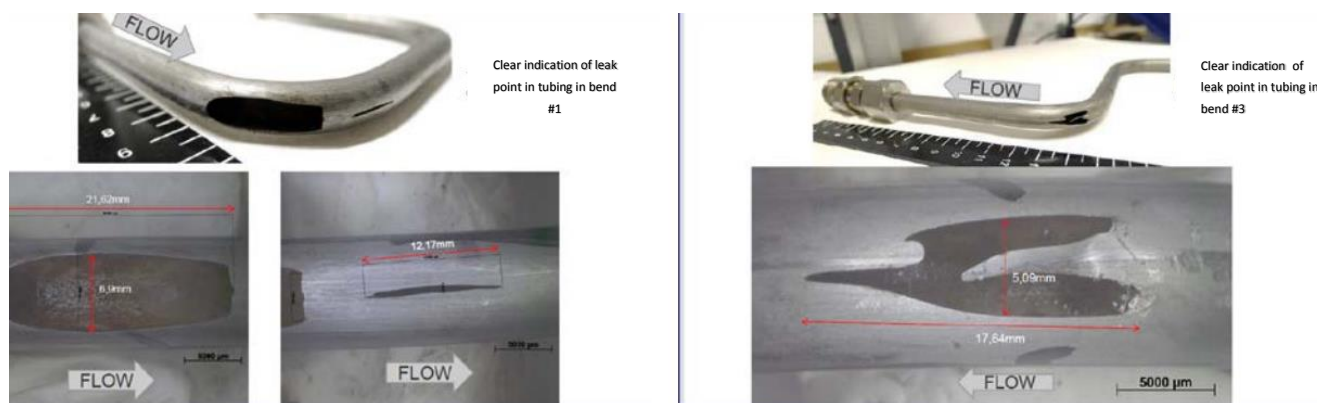


Figure: Pressure equalising tubing with leak points

Causes

Direct cause:

Erosion due to sand in the well flow damaged the tubing during pressure equalisation.

Root causes:

- Sand content in the medium (well flow) that was used for pressure equalisation.
- Pressure equalising tubing was not designed for sand erosion.
- No adequate risk assessment of the effect of sand in the depressurising systems.
- No adequate strategy for handling sand production for the plant.
- Instrument tubing was not a part of the established maintenance program.
- Recommendations from the investigation team: It should be considered to use the modification process when using temporary equipment such as the sand cyclone.
- Ownership of the technical integrity of the sand cyclone was not clarified.

Learning points and recommendations:

- Finalise and document the sand handling strategy for the plant
- Address erosion in design and maintenance
- Improve the process for technology qualification
- Identify responsible person for follow up of technical integrity of the sand cyclone system
- Ensure adequate systems for management of change when using the plant for other conditions than it is designed for.