

Corrosion Mechanism:

Oxygen corrosion

Alloy:

Plain carbon steel, X42

Equipment:

NPS 3 gas flowline

Corrosive Environment:

The line transports produced sweet gas (0.31% CO₂ at 480 kPa and 15 °C) as well as produced brine from an individual well. Produced water is separated at the wellsite into an un-blanketed storage tank and trucked out. If the tank water level builds to the high level mark it is set up to dump the produced water back into the gas line and result in oxygen entry with the water from the tank

Comments:

The line was in operation for 31 years before the failure. The line was not under any corrosion inhibition program for internal corrosion control.

The failure pit had steeply sloping walls and was indicative of a dissolved oxygen corrosion mechanism. The failure occurred within the first 200m of the pipeline

which is also indicative of oxygen attack where it is relatively quickly consumed by corrosion reactions within the immediate downstream piping from its entry point.

Remedy:

Avoid reinjection of the oxygenated water into the gas line or use appropriate gas blanket on the tank to avoid oxygen ingress into the system.

