

CASE STUDY NUMBER:	Case Study 22
DESCRIPTION:	4" T-PIECE WITH FLANGE NOZZLE
CLIENT:	TENGIZCHEVROIL

SERVICE:	
Line size	4"
Design Pressure	13,7
Operating Pressure	1
Design Temperature	100
Operating Temperature	50
Material	SA-333 Gr6
Line Class	150k01

ANOMALY DESCRIPTION:

Complete separation of a 2" branch on a 4" header due to extreme corrosion underground.

Client report:

5 random areas were excavated to determine condition of underground piping.

Visual inspection results are following:

- General and pitting corrosion of the main header, separate pits are up to 3mm deep
- Damage of drain nozzle
- Significant general corrosion of vertical pipe sections
- Areas with through wall damage of heater tracer. Currently heat tracing is switched off
- Insulation is damaged
- Missing sand in trays
- Damaged or completely missed piping protective coating
- Water is in trays

In accordance with UT results minimum measured thickness of 4" header is 3.6mm

ROOT CAUSES

Cause of general and pitting corrosion is multiple coating damage and direct contact of piping with ground water.



INTEGRITY CONCERNS (INCLUDING PICTURES)

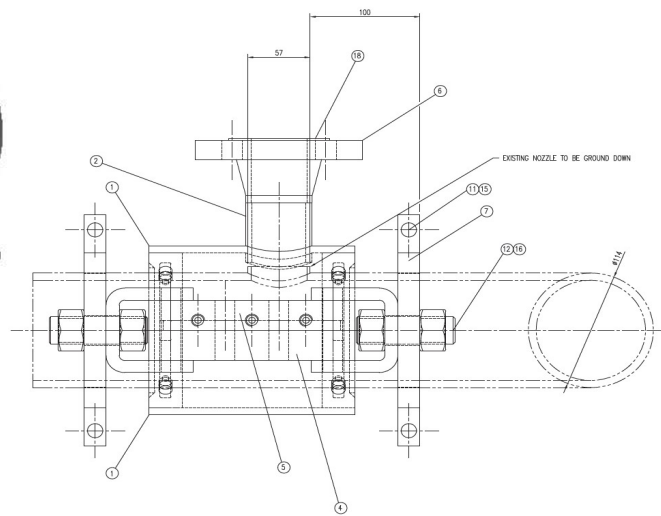
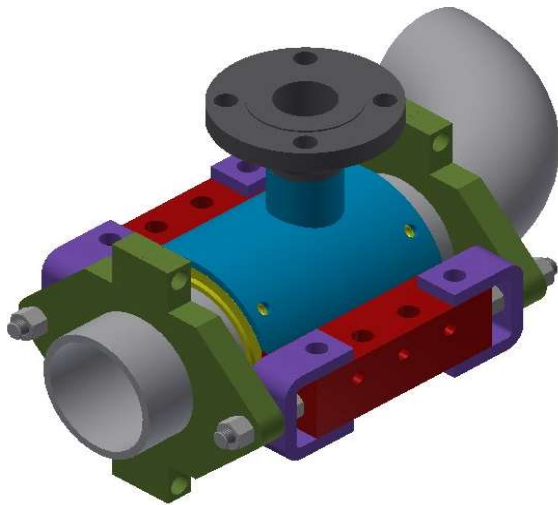
Operation of piping with damaged nozzle is not allowable.

THE BERUSEAL SOLUTION (WITH PICTURES)

A straight line enclosure was designed with a 2" nozzle and welded flanged connection. This allowed the client to re route the failed piping and connect it with another flange connection to the leak sealing enclosure. This allowed normal process flow and the return of the line back to pressure.

A strongback system was also designed should there be full circumferential failure due to any more deterioration underneath the clamp and weakening of the header pipe (due to the branch line that corroded away)

The enclosure was designed according to ASME v111 Div1 and ASME PCC2



INSTALLATION PICTURES



CONCLUSION

PTFE Compound was injected into a pre cut sealing groove around the entire seam of the enclosure and around the pipe bores to create a successful seal.