CASE STUDY NUMBER 1

Mixed Sour Gas Manifold-Weld-O-Let cracks

CLIENT:	KAZAKHSTAN
DATE:	23 JANUARY 2014
DESCRIPTION:	Mixed Sour Gas Manifold-Weld-O-Let cracks
Service:	Sour Gas
Line Diameter:	20 to2”
Design Pressure:	85 BAR
Operating Pressure:	66.7 BAR
Design Temperature:	190°C
Operating Temperature:	95°C
Material:	SA-358
Line Class:	900P21

Anomaly Description:

Axial orientated cracks were found in one butt weld and one fillet weld on a 2” pipe with RT on the U300 Mixing Manifold. (See attached photos 1 & 2 below)

Root causes:

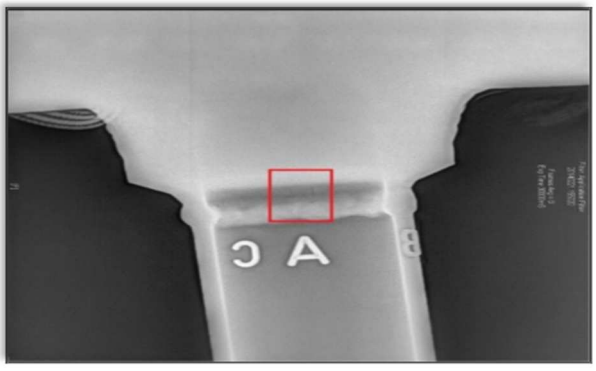
Probable cause of the defects is availability of wet chlorides causing stainless steel chloride cracking

Integrity concerns:

There was a high risk for the further growing of the known defects and it is not improbable that further defects may develop.

Picture 1

Picture 2

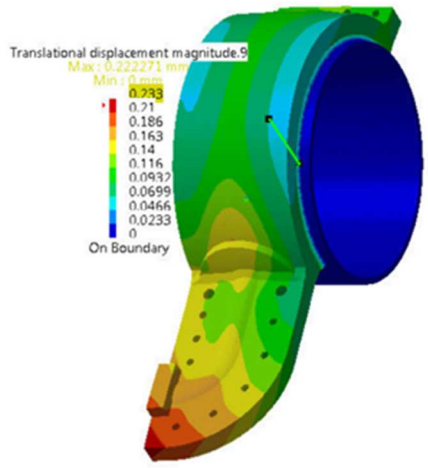


BERUSEAL SOLUTION:

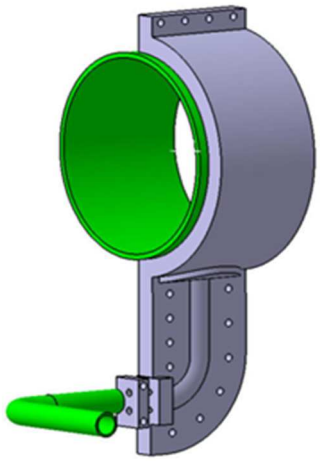
Clamp Design:

An analysis of a clamp for a sour gas line was made for the cracked weld-o-let. The design was to firstly seal the whole area to prevent leakage without putting any additional stress into the already cracked weld, and secondly, support the drain should the weld crack through completely. Beruseal designing dept designed a strong-back clamp and used FEA (Finite element analyses) technology to determine stress levels that would be imposed on the clamp in the event of catastrophic failure of the weld. The design was made according to ASME PCC2 and underwent stringent analysis by Client engineering house Department and found to be acceptable. (See attached pictures 3 & 4 below).

Picture 3



Picture 4



Seal:

The clamp was a multi medium system where the use of PTFE based compound was inject into a pre-cut groove around the clamp and bores of the large diameter pipe to create an outer seal. Surface preparation was made to the 20” line and the inside of the clamp to ensure adhesiveness of the resin, the clamp was then filled with a two part high temperature epoxy resin. The resin is resistant to hydrocarbon attack and highly adhesive which also acted as additional support for the cracked weld. (See attached pictures 5 below).

Picture 5