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He is an Electrical Engineering graduate from the REC Bhopal. He has more than 25 years of experience in pipeline operations, maintenance & ROU management. He is currently posted at pipeline department of Oil Industry safety Directorate (OISD).

He is conducting safety and technical audit of offshore as well onshore product, natural gas, LPG, crude oil and cryogenic pipelines of public and private.

Pipeline Burst In 30” Crude Oil Pipeline

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Additional Director (PL)



30” Crude Oil Pipeline Burst Incident

Pipeline Diameter	30 inch
Wall thickness range	7.9 mm – 12.7 mm, (higher thickness at crossings)
Weld type	Spiral weld
Steel grade	API 5L X65
MAOP	68.3 kg/cm^2
Design factor	0.72
Year of commissioning	2008
1st ILI	2012 (all defects repaired post ILI)
2nd ILI	2019 (most defects repaired post ILI including some section replacement)
Year of incident	2022
Discharge pressure	59.0 kg/cm^2 (before incident)
Flow rate	2450 kl/hr

30” Crude Oil Pipeline Burst Incident

At site:





30” Crude Oil Pipeline Burst Incident

Site photograph:



Fish mouth opening in pipeline

30” Crude Oil Pipeline Burst Incident

General

a. Line patrolman informed over phone about crude oil leakage, who was coincidently present in nearby area.

b. Upstream and downstream valves were closed.

c. Evacuation of spilled crude oil with water was started and shifted to location. Pipeline was shut for 5 days.

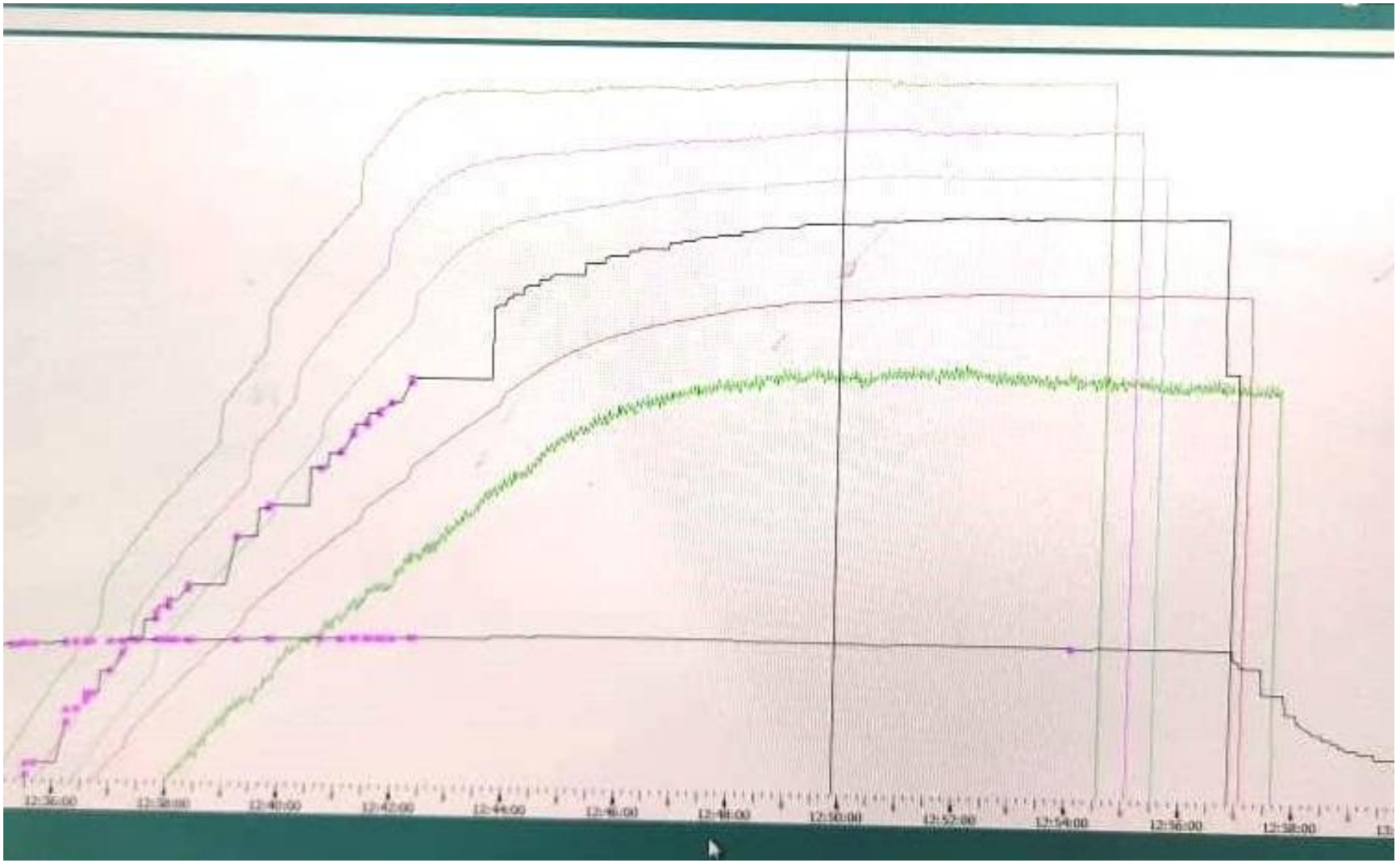
d. Weld plus connector was used to weld new pipe piece in mainline.

Site Visit

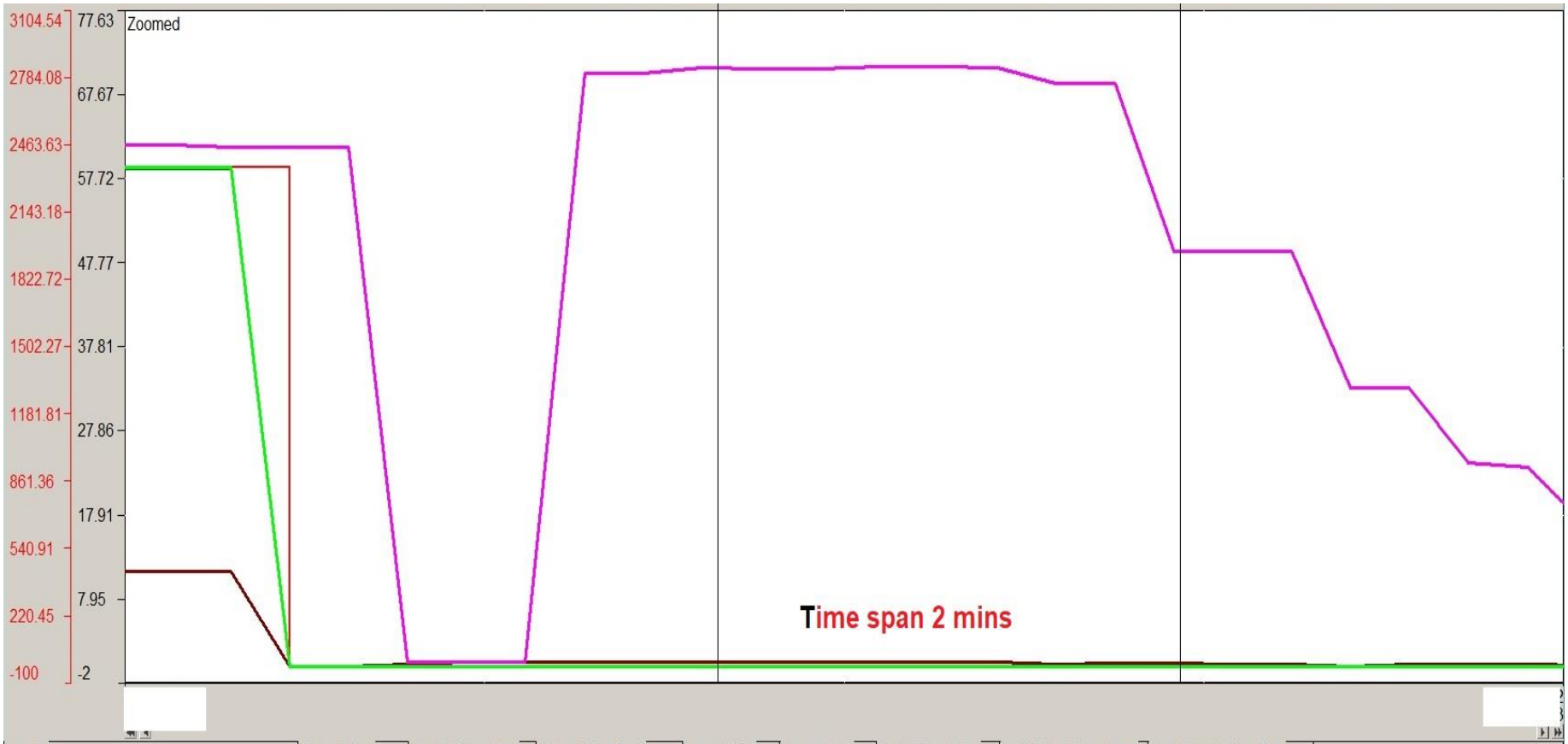
a. During site visit, 3 heavy (mechanical) scratch marks were visible on pipeline at burst point.

b. The burst pipe spool was having lot of internal pits due to corrosion. This indicates the corrosive property of the crude.

Pressure Trends of Sectional Valve



Mainline Pump Pressure n Flow



Line ID	Slider Value	Slider Value Time	Slider Value Date	Lower Limit	Upper Limit	2nd Slider Value	2nd Slider Value Time	2nd Slider Value Date
FLOW	2828.36	12:53:00	26-05-2022	-100	3104.54	1954.62		
PT-103	0.48	12:53:00	26-05-2022	-2	77.63	0.38		
PT-104	0	12:53:00	26-05-2022	-2	77.63	0		
PT-105	0	12:53:00	26-05-2022	-2	77.63	0		
PT-1711	0	12:53:00	26-05-2022	-2	77.63	0		
PT-1712	0	12:53:00	26-05-2022	-2	77.63	0		

ANALOG RTD

Integrity n Coating Survey

Pipeline Repair

a. Post ILI 2019, some sections were replaced, and balance were repaired with sleeve welding.
b. Incident site was also opened in 2020 for sleeve welding.
c. All urgent and prioritized defects were repaired and MAOP was restored in Mar-21.

Coating Survey:

a. CIPL report dated 03.10.19 indicates, pipeline was in protected zone and potential maintained between - 0.850 volt to - 1.200 volt.
b. DCVG survey report dated 08.02.21 indicates, no moderate or severe coating defect at incident site.
c. On-off survey report, of quarter Oct-Dec 21 and Jan-Mar 22, indicates pipeline was in protected zone.

Laboratory Investigation

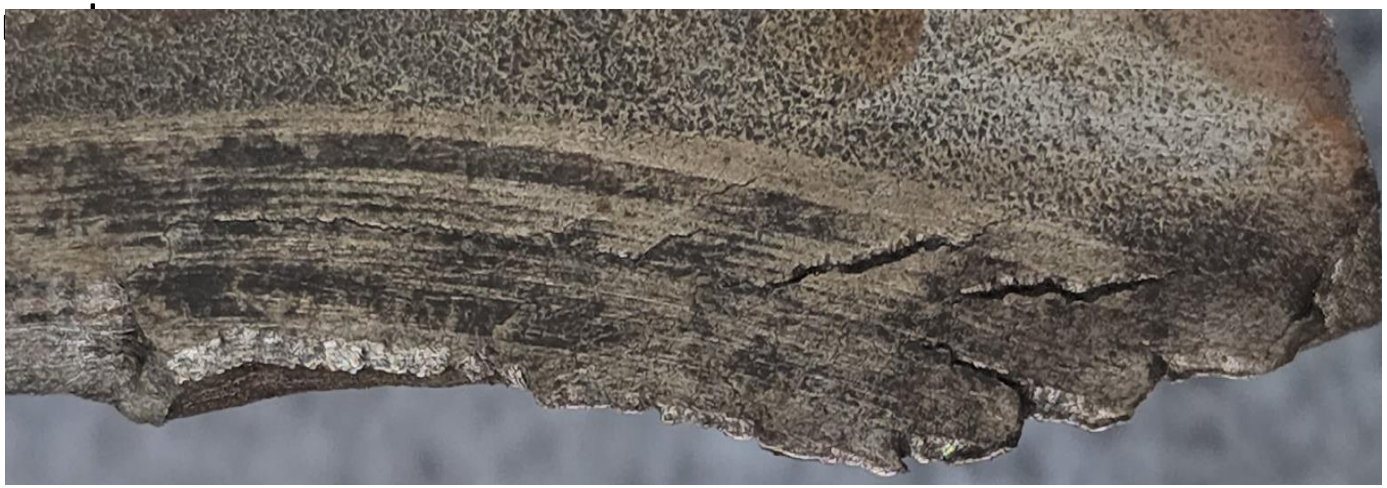
a. Failed pipeline sample was investigated by laboratory:

b. Microscopic examination indicates general microstructure along the circumferential thickness of the pipeline.

c. Chemical composition of the pipe was found to be matching with API 5L X 65 grade.

d. Ultimate Tensile Strength (UTS), % Strain, Impact evaluation and Hardness of the pipeline samples were evaluated and found in limit.

e. Laboratory confirmed the multiple gouge mark and initiation of micro fracture in parent metal, which initiated from pipe outer to inner along the gouge



Conclusion

a. All field reports and laboratory analysis were indicating mechanical damage to the pipeline.

b. This impact caused micro fractures in the pipeline at impacted place and around.

c. Depth of fractures were increased over the period due to low fatigue pipeline operation.

Weld Plus Repair



Recommendations

1. To establish the roles and responsibilities of key officials i.e., site in-charge and HSE officer.
2. To ensure methodology to witness and assess the pipeline repair work by company personnel/ Third Part Inspection (TPI) along with documentary evidence.
3. To review mechanised excavation procedure to safeguard mainline from any damage especially during such repair & maintenance jobs on a running pipeline.
4. Corrosivity of crude shall be assessed in terms of sulphur content at scheduled frequency and mitigation measures like biocide and corrosion inhibitor dosing.
5. Inline inspection at 5-yearly interval for sour crude in line with clause 9.1 of OISD-STD-188.
6. ILI tool specifications i.e., crack detection capability and frequency to be finalized keeping in mind various types of anomalies, corrosion growth and various failures in similar pipelines to maintain integrity of the pipeline.