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Case Study

Pipeline Scanning using Low Frequency Electromagnetic Technique (LFET)

Pipeline Scanning work was carried out by **TesTex** using **Low Frequency Electromagnetic Inspection** in December 2014 in one of the LPG Pipeline with **TesTex make LineCat System** to detect, locate and measure the extent of corrosion and pitting from top side as well as under side, if any in the Pipeline.

Pipeline details were as follows,

- **Pipeline Diameter** — 10” O.D. x 7.1 mm thick.
- **Product Stored** — LPG
- **Pipe Material** — API5L-X42

Equipment used for scanning purpose was Falcon Line Cat based **Line Cat Inspection System** developed and manufactured by **TesTex Inc., U.S.A.**

Low Frequency Electromagnetic Field, which is generated by the system, penetrates through the plate thickness and the sensors detect any abnormal variation in the plate thickness whenever the scanner approaches the flaw. This can also be observed viewing the LED display on the scanner.

These abnormal variations are so small that it becomes necessary to use Digital Signal Processing (DSP) to enhance the resulting signals, which are in the form of phase, and amplitude.

Inspection was carried out in the following sequence,

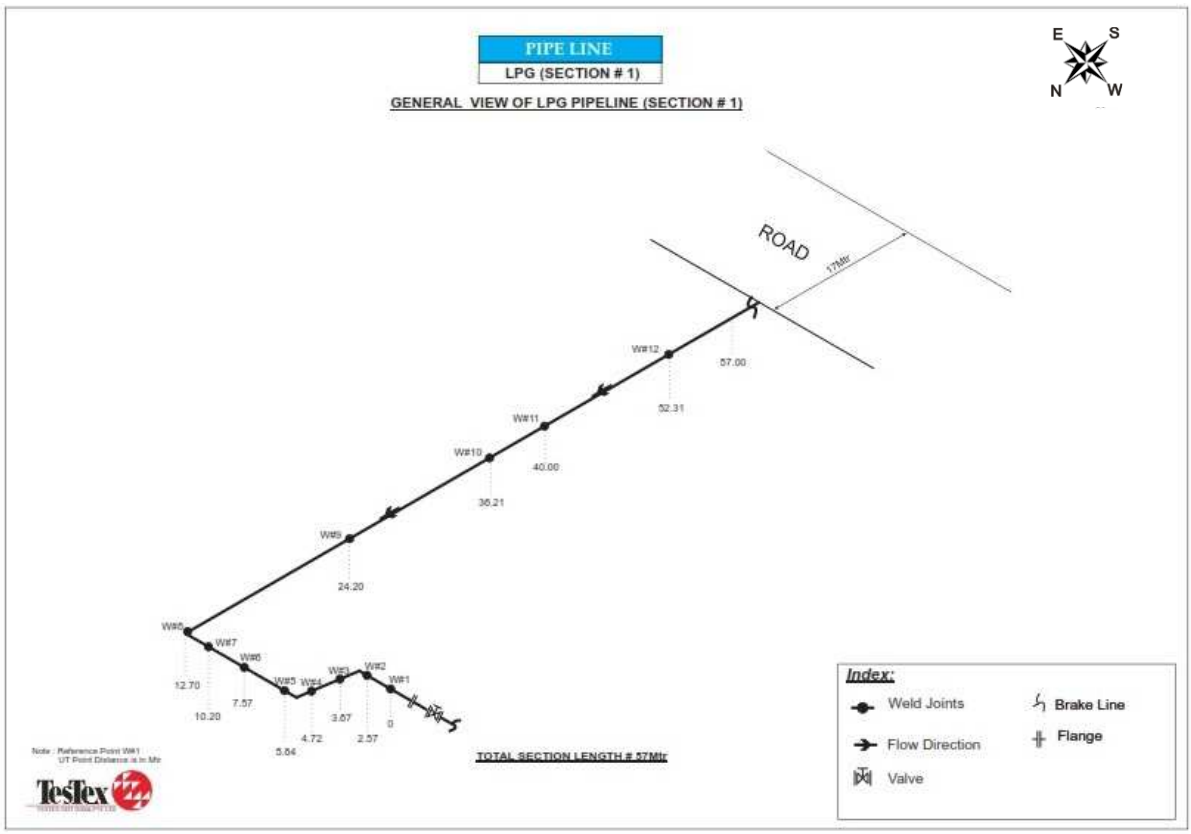
- Pipeline was visually inspected for any surface defects.
- Pipeline was numbered according to the clients specifications.
- Pipeline was scanned using Falcon Mark II system and defects were marked for further verification.
- Actual Thickness of the defective area was verified by UT.

EQUIPMENTS USED

1. Falcon Line Cat
2. Mux box
3. Hood – 10”
4. Pods
5. Octopus Cable
6. Jumpers

Equipment assembled on the pipeline

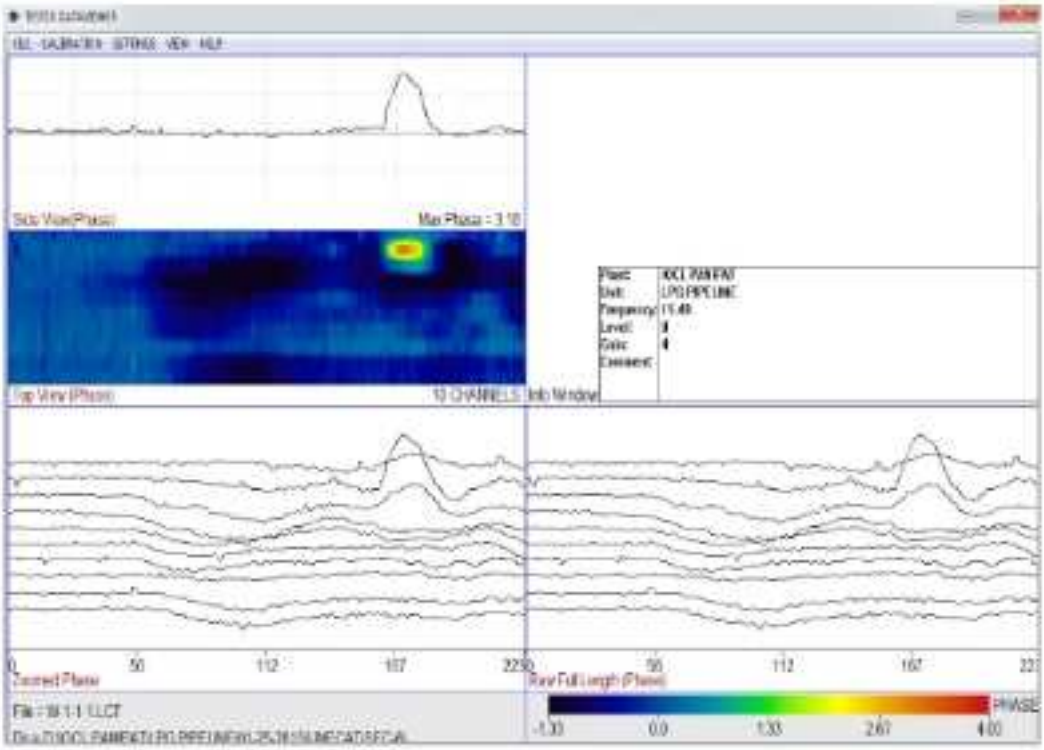
Pipeline layout



Pipeline Area layout

Sample Waveforms of Defective Plates

LPG PIPE LINE **SAMPLE WAVEFORM**



Above waveform shows Topside pit upto 3.3mm deep found on 2150.29 Mtr at 5:30 O'clock.

Above picture indicating Topside pit upto 3.3mm deep found on 2150.29 Mtr at 5:30 O'clock...

Photographs Showing Defective areas in Pipes

Discussions:

Pipeline was taken out of service with a suspected pitting however actual location of the pits was not known. Visual / Ultrasonic inspection did not confirm the pit area on the pipe.

Pipe was offered for scanning and **Low Frequency Electromagnetic Technique** was used. On scanning severe pitting patches were detected on the 6 O'clock position of the pipe. Further investigation confirmed tiny pits which were extending from the corrosion patched.

Pipeline was put back in service after removing the affected areas and replacing them with the new pipes.

Conclusion:

Periodic inspection of pipes is very much required as in the Indian environment soil side corrosion is a major concern as seen in the above case. 5 years inspection period is generally followed by the industry but in certain cases it extends beyond 7 to 8 years.

Conventional techniques like Ultrasonic Thickness checks does not give the actual condition of the Pipes as it not even covers 0.1% of the pipe area. Since the inside area is not accessible these UT readings are taken randomly and almost all the time misses the active corrosion areas which lead to leakages in the running operations. By deploying the above Inspection Technique the extent of damage was exactly mapped and actions were taken based on the scanning results.