



CYPRESS
In-Line Inspection

EcoVision™ Extra High Resolution MFL Condition Assessment

Background:

Cypress ILI has developed and patented a unique In-Line Magnetic Flux Leakage (MFL) tool capable of inspecting mortar-lined steel pipe. This advanced system and method has successfully inspected over 200 miles of large diameter transmission mains, aqueducts and penstocks.

MFL is a magnetic method of non-destructive testing that is used to detect corrosion and pitting in steel structures and is commonly used in oil & gas pipelines. The basic principle is that an In-Line Inspection (ILI) tool with a circumferential array of powerful dipole magnets is displaced (in this case pulled) through the inside of the pipeline magnetizing the steel. Hall-Effect (magnetic field strength) sensors are positioned between the poles of the magnets to detect pipe anomalies.



As the tool travels down the line the magnets fully saturate the pipe wall. If that magnetic field remains constant (does not fluctuate) there is no corrosion. If there is fluctuation, an anomaly is located at that point. All this data on the condition of the pipeline is stored, and upon completion of the run is download to Cypress ILI's proprietary software used to size the defects.

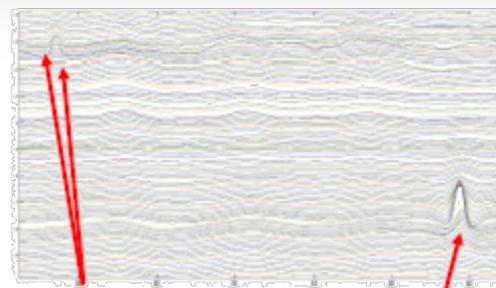
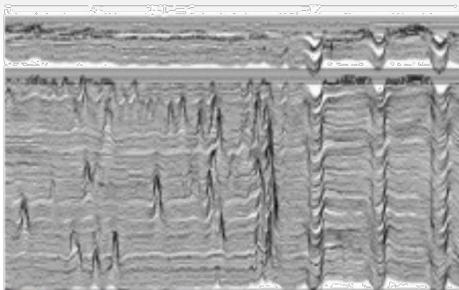


Operating Capabilities:

- Capable of inspecting 48-in to 120-in diameter mortar-lined pipe with 1/2-in to 1-in mortar thickness.
- High resolution sensor detection and capability.
- 1/4-in sensor spacing providing the most accurate metal loss detection and sizing for the water infrastructure industry.
- 90% Probability of Detection (POD) that can size anomalies (length, width, and depth) with a high degree of accuracy.
- EcoView™ Software allows for fast and accurate viewing of the pipeline data collected by our extra high resolution tools
- Operated by two Electric Tow Vehicles (ETVs). Each ETV is attached to the front and back of the MFL tool.
- When disassembled the system can pass a 14-in x 16-in manway or access point. The entire system is then assembled inside the pipeline for deployment.

MFL Tool Data:

Deeply pitted section of pipe adjacent to three stiffener rings.

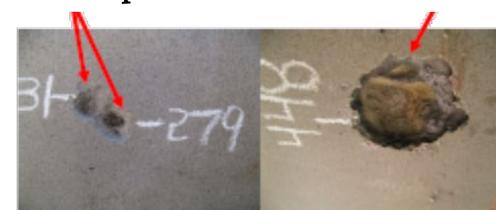


54% & 44%
Pit Depth

90% Pit Depth

In-Ditch Verification Results:

Deeply pitted section of pipe adjacent to three stiffener rings.



Pipeline Damage by 3rd Party:

The images below demonstrate the data analysis of an anomaly detected during the condition assessment of a mortar-lined large diameter pipeline. By exposing the pipe during this in-ditch verification activity, the anomaly length, depth, and width was validated against the extra high resolution MFL tool. This damage, was in fact a gouge, was likely caused by a farming plow and was not detectable by any other means. With the high potential of resulting in a leak or rupture, the damaged section was replaced. Cypress ILI can also run a “caliper” tool through the line prior to the MFL operation to record any dents, ovalities, coating damage, and/or any other restrictions that would impede flow rates or safe MFL tool passage in the pipeline.



70% Pit Depth



4085 Commerce Drive, Murray, UT 84107
Main: (346) 249-8771

5727 S. Lewis Avenue, Ste. 500 Tulsa, OK 74105
Main: (877) 663-2977