

Complex Crack Detection

In an Above-Ground Pipeline



Challenge

An above pipeline with identified complex cracking required inspection analysis and anomaly repairs within a tight deadline.

Transporting hot fluid, the line experiences large temperature changes. It is well isolated and includes a high number of bends to allow expansion. Deposits appear in the form of bitumen, which in its natural state is too viscous to flow.

Field investigations of this line identified cracking features. The presence of such features determined a possibility that some features located within bends had exhibited axial/circumferential cracking with complex angles.

This would be the first completed inspection for the line, which has been operational for six years, forming a starting point for ongoing integrity management. Although no previous projects were completed for this customer, NDT Global was chosen based on a reputation for customer service, accuracy and quality data analysis.

Solution

An NDT Global field verification expert worked closely with the field crew and conducted phased array UT (PAUT). PAUT enhances the understanding of the crack geometries and provided crack depths prior to non-destructive testing. This enabled the prioritization of structured maintenance according to the identified features.

Working alongside third-party NDE groups, NDT Global's field verification expert performed additional measurements using phased array, time-of-flight diffraction (TOFD) and traditional shear wave technologies.

NDT Global utilized 24" ultrasonic crack and circumferential crack detection tools. As complex angle cracking was outlined as a threat, both crack detection tools were custom built and configured to record data at a 1.5 mm (0.05 in) axial resolution to ensure the data provided the best resolution to accurately detect and size features to a minimum length of 20 mm (0.79 in).



Axial Cracks



Circumferential Cracks



Metal Loss



Geometry Ovalities



Mapping



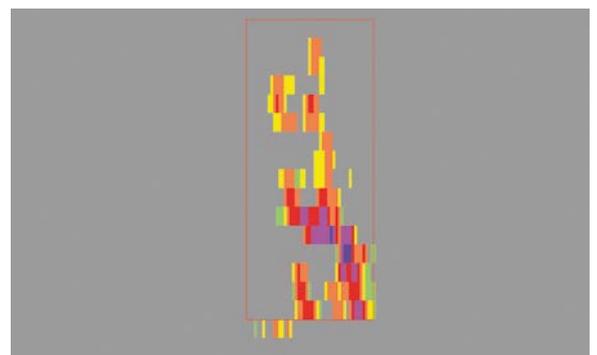
Results

- **Streamlined repair program:** A streamlined repair program was introduced based on reliable ILI reports. This enabled the customer to prioritize maintenance, repairs and resources, while having a starting point for ongoing integrity management of this asset.
- **Tight schedules:** The entire project from inquiry to delivery of final reports occurred within 80 days. The reporting timelines were extremely tight with the first preliminary report delivered within 7 days of receipt of the tool, and the final reports were delivered within 30 days.
- **Detailed results:** NDT Global provided 53 circumferentially-oriented and 52 axially-oriented features from the final analysis phase. Additionally, through customized analysis targeting features outside of tool reporting tolerances, specifically in areas of the bends, another 348 potential sloping crack like indications were identified. Of the combined axial, circumferential and potentially sloping indications, 119 were investigated to determine the accuracy and reliability of the inspection data as well as to complete the integrity management program on this system and bring it back into operation.

A streamlined repair schedule was required to bring this line back into service as soon as possible.



Example of the complex cracking



Complex crack field, max. depth 7.5 mm (C-scan)