Title: Ultrasonic In-line Inspection Technology and Fitness-For-Service Assessment for Non-Traditional Pipeline Inspection Applications

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Main Paper:

Recent high-profile pipeline failures have focused increased regulatory scrutiny on the integrity assessment and management of pipeline assets throughout the world. While many piping systems have historically been deemed “unpiggable,” advances in smart pigging and other inspection technology now allow for inspection of these lines. Many modern ultrasonic inspection tools not only accurately size the length and depth of a flaw, but make it possible to go beyond the older assessment methodologies and run Level 2 (Effective Area) assessments on areas of metal loss or build finite element models of individual dents in order to demonstrate fitness-for-service. Gathering a high quality data set from an inspection allows for better planning and overall management of a pipeline system.

Not only does such data allow an operator to draw a more complete picture about the state of the pipeline and what damage mechanisms may be involved, but precise direct measurements allow an operator to make more accurate decisions about remediation, inspection frequencies, and corrosion growth rates. In addition, for pipelines with restricted or limited access, high resolution data allows for further assessment of defects and damage mechanisms using methods such as finite element assessment or advanced statistical modeling. These advanced assessments provide the operator with greater value from individual inspections.

The ability to avoid prove-up and repair digs caused by an overly conservative assessment methodology can save an operator money that can then be used on other inspection or remediation projects. Unnecessary repairs lead to an integrity management program that is not conservative because finite resources are diverted away from areas or projects where they could be more useful. High-resolution data allows for an integrity program which can correctly identify and prioritize the highest priority defects.

Case Study

A pipeline operator needed to inspect a pipeline running through a major metropolitan area. The pipeline had been constructed in various phases over time and contained numerous transitions from 6” to 8” and back again. Several previous attempts at inspection had failed and the operator was left with hydrotesting as the only option for regulatory compliance.

Quest Integrity Group employed a dual diameter 6”/8” tool that navigated the small radius bends present in the line while collecting radius and thickness data on both the 6” and 8” sections of pipe in a single inspection. By working collaboratively with the operator throughout the inspection process, the first run of the InVista™ tool was successful and over 32 miles of high-resolution ultrasonic data was collected.

This high-resolution inspection data provided the operator with a more complete picture of its pipeline. Not only was previously unknown third party damage discovered, but information about the original construction of the pipeline could also be seen in the data. Previously unknown schedule and weld type changes were observed, and all features were mapped to known above ground locations.
With ultrasonic data from a successful inspection, the operator can now address issues with this pipeline before they become significant problems. In addition, the cost savings from avoiding subsequent hydrotests can instead be more efficiently redirected to other integrity management projects.

**Summary**

Unpiggable pipelines present a unique set of challenges, but benefit from high resolution direct measurement as much as lines that are conventionally piggable. Difficulty in access puts a premium on ease of inspection as well as on accurate, actionable data and assessment. While methods such as a hydrotest may achieve regulatory compliance for a pipeline, this compliance alone is not an assurance of safe or cost-effective operation. The detailed inspection data an ultrasonic ILI tool can provide allows for better planning of inspection frequencies, corrosion growth analysis as well as repair and mitigation plans. In this way, a high resolution dataset allows for increased overall cost savings which can be used to enhance the overall operational integrity of the entire pipeline system.