



## Project Management and Execution of Tethered In-line Inspections of Challenging Pipeline Segments

Jeff Harris, Area Manager, Technical Services, ROSEN USA, Houston, Texas, and Paul Guy, Operations Manager, Superior Pipeline Services, Indiana, Pennsylvania

The pipeline industry's need to inspect pipelines with the preferred in-line inspection method has become more and more apparent over the last decade. As pipeline operators work to complete their baseline assessments many have found it difficult to find economical ways to thoroughly inspect their challenging pipelines, or "nuisance" HCA's.

Pipeline segments with small inspection length, cased road crossings, river crossings, and systems with no or low product flow, are examples of pipelines that have been deemed unspiggable according to traditional in-line inspection methods.

By joining together with Superior Well Services, ROSEN USA found a partnership that brought together experience not previously seen in the industry in regards to ILI technologies and tethered, or wire line, inspections.

ROSEN USA together with Superior Well Services, is able to leverage Superior's wire line, or down hole, equipment and expertise and apply it to the inspection of oil and gas pipelines. The down hole wire line inspection technique has been used in the oil field for decades, but tethered inspection is less prevalent in traditional oil and gas pipeline systems.

This paper will discuss the capabilities of tethered in-line inspection. The discussion will included the benefits of using ILI for unspiggable pipeline segments vs. ECDA or hydro-testing, give operators an understanding of project management needs and set expectations, what types of ILI technologies can be used, and the quality of data that operators can expect to obtains from tethered inspections.





### Background

As is commonly known, the preferred method to assess the integrity of a pipeline segment is to conduct an inline inspection (ILI) survey. There are a large number of segments that are considered un-piggable using traditional ILI methods. We like to refer to those segments as challenging, or difficult to inspect. For these challenging segments Operators can utilize the tethered inspection method using traditional ILI tools to perform the inspection, if careful planning and execution is carried out through the project phase.

What exactly is a tethered Inspection? A tethered inspection is an ILI survey that is performed by attaching an ILI tool to a wireline or tethered apparatus. Once the tool is connected to the wireline device it is pull through the pipeline.



"Pig on a String"

Typically, there are 2 set-ups that are most common. A single entry inspection and dual entry inspection. A single entry set up is the most common with the dual entry used for added security when surveying longer segments, or under bodies of water such as rivers or lakes.



Single Entry Points



Dual Entry Point

The main advantage to a full ILI inspection using the tethered means is to obtain the most useful information about the small segment of pipeline. All results produced are equal to that of a conventional ILI. All types of inspection devices can be used; MFL, Geometry, Axial Flaw detection, and EMAT. Because of the limitation of guided wave surveys for detection of actual sizing of the anomalies, and that hydrotesting may eventually damage the structure of the pipeline, tethered surveys provide invaluable data and play a vital role in an operators Pipeline Integrity Program.

The Tethered ILI survey method can be used for:

1. Small inspection lengths
2. Cased road inspections
3. Systems with low flow or lack of product flow
4. Valve areas, crossover in short lengths inside compressor stations
5. River Crossings
6. Inspection of HCA Only (High consequence areas)
7. New Construction, Horizontal Directional Boring Projects
8. Oil and Gas production line
9. Other challenging segments.

The disadvantages of a tethered ILI are that 1) the pipeline has to be taken out of service (your customer may be impacted if another source of the product cannot be supplied due to a single source), and 2) that the length of the segments may be limited due to the capabilities of the tethered apparatus or the bend radius of the pipeline.

A tethered ILI project may require a different mindset than a normal ILI project would: being prepared before the assessment is a very important aspect of completing the project in an efficient timeframe.

Project management becomes a very important process and involves several steps that must be defined. The steps required are; 1) Pre-Assessment, 2) Project Execution and Inspection, and 3) remediation and repairs.



The pre-assessment stage is done to determine the location that needs to be inspected. These areas may have already been determined by local or government regulations. The Pre-assessment, like any step, should be thoroughly thought out so that all aspects of the project are considered. I have included a list below that may not be inclusive of the all factors, but can be used as a guide.

1. Determine the locations that need to be inspected
2. What are the length of the segments that need to be inspected
3. How segments can be assessed (determined by pipeline conditions)
4. Choosing that right inspection tool, which tool should I used (deformation, metal loss, crack, etc.)
5. On-Site Project Management
6. Can you perform multiple inspections in the same mobilization to reduce costs
7. Do we need special permits or environmental considerations
8. The construction areas and workspace

The next stage is the Project Execution phase. Project planning is the key to any ILI project and can be applied to each type or method of ILI inspection. With this type of project, the goal is to minimize the down-time that the segment of the pipeline needs to be out of services.



Project Execution:

1. Assemble the project team
2. Get all the right people in their right places.
3. Properly prepare the site
4. Perform cleaning runs prior to the inspections
5. Perform the ILI run
6. Determine if the run was successful
7. Determine the "OMG" List



Install flanges for pack-off assembly and insertion of cleaning/tow pig.



Assemble Pack-off for Propelling Toe Pig to Opposite Ends



Insertion of ILI tool into Pipe Segment

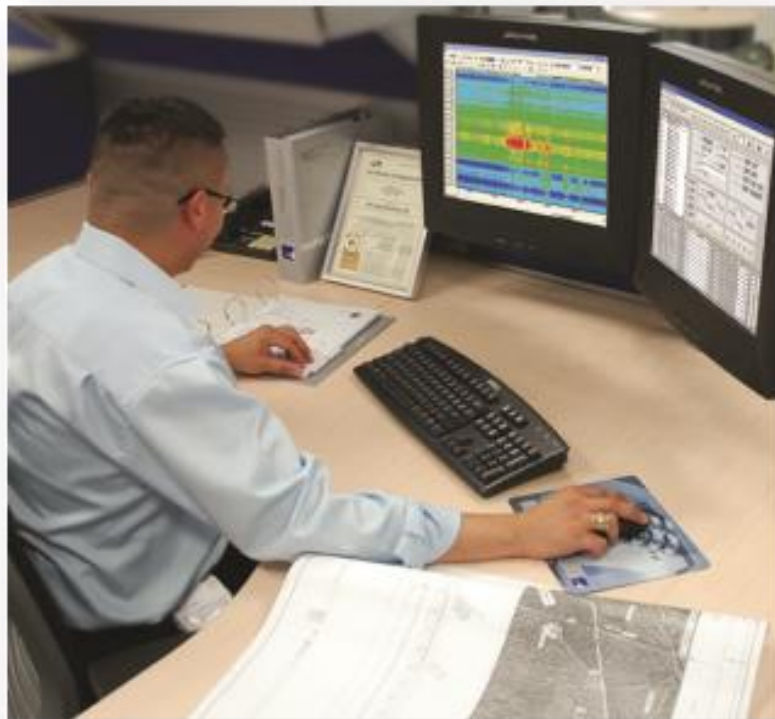


Retrieval of ILI tool

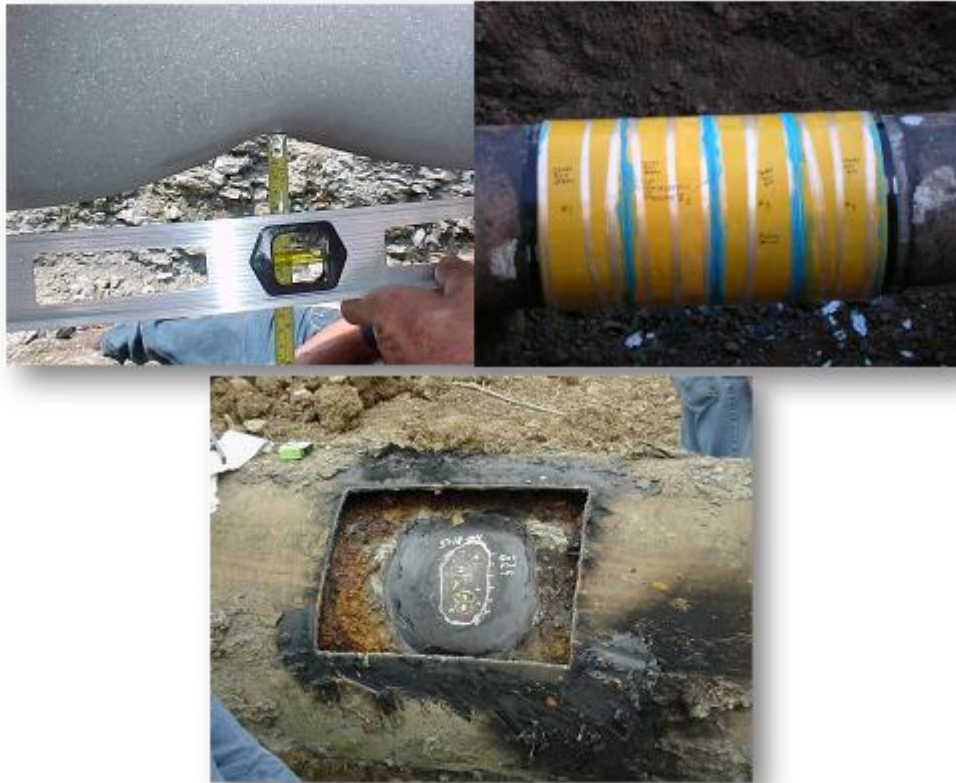




Review of the Data on Site



Final Report Viewing



Find the anomaly and Make the repairs

#### Summary

The object of any project is to be successful. Careful planning is the key to a successful tethered ILI project. The project must be clearly defined. The project requires a team approach. Team work and communication between all affected stakeholders must be clear and all pieces and functions of the tethered inspection must be carefully planned and executed.

End.