

Innovations in In-Service Robotic Inspection of Unpiggable Natural Gas Pipelines at River Crossings for Which There are No Existing Launching and Receiving Capabilities



PPSA Seminar 20 November 2024



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River-Crossings are Critical

With the critical role natural gas plays in our energy infrastructure, ensuring the integrity of transmission and distribution pipelines is paramount as these river crossing pipelines ensure infrastructure connectivity and energy availability to a vast array of communities and businesses worldwide.



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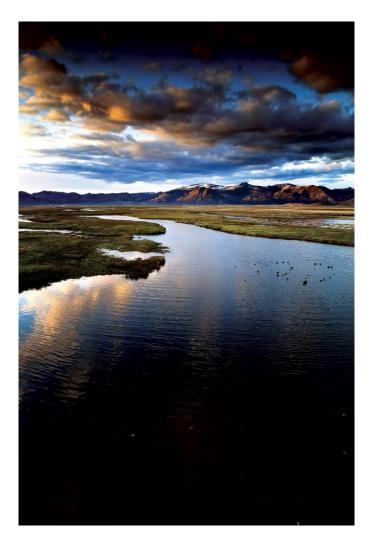
River-Crossing Pipeline Failures

Impact to the Community

- Contamination of local ecosystem
- Supply disruptions to households or businesses
- Build-up of combustible gas / Explosion

Impact to the Operator

- Legal / Regulatory repercussions
- Damage to public image / valuation
- Closure of the business





Alternative Inspection Techniques

External Corrosion Direct Assessment (ECDA) via Diver

- Visibility Challenges
- Limited access to the line (buried)
- Time constraints from equipment
- Dangerous (current/flow)

Sonar Survey via Boat

- Low-resolution / poor detection of anomalies
- Only general features
- Debris/rock/coverage can distort signal



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Alternative Inspection Techniques



Free-swimming Inline Inspection (ILI)

- Piggable vs unpiggable
 - Lack of Launcher/Receiver
 - Inability to shut down the line
 - Unknown pipeline conditions
 - Difficult to track tool underwater
 - Potentially costly retrieval





Pipe Explorer Robotic ILI Summary

Non-tethered

Self-propelled

100% controlled

Constant 300 m/hr, no speed excursion

Bi-directional

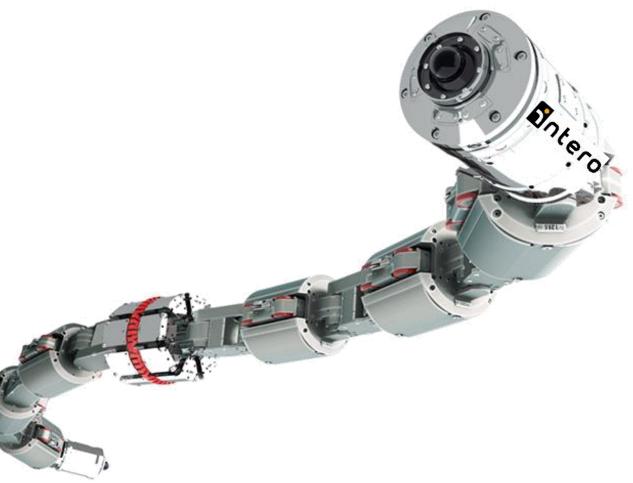
Up to 50bar in-service inspection

Mitered elbow (no radius)

Barred/Unbarred tee navigation

20% bore reduction

Camera, MFL, and Laser sensors







Pipe Explorer Robotic Fleet



Pipe Explorers available in sizes from 6" (DN150) to 36" (DN900):

Pipe Explorer 6

Pipe Explorer 8

Pipe Explorer 10/14

Pipe Explorer 16/18

Pipe Explorer 20/26

Pipe Explorer 30/36



Track Record

- Successfully deployed since 2010
- More than 1,600 inspections completed
- 99% success rate
- Shortest inspection 20 meter
- Longest continuous project: 6.1km
 - Live gas conditions
 - Inline charging technology



Brooklyn (NYC), NY - 20", 24", 30" pipeline inspection

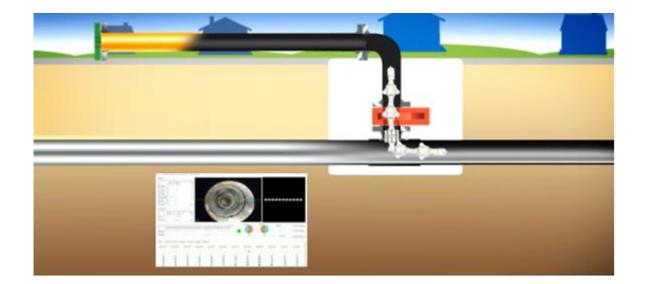
INSPECTION

SERVICES



Live Gas Launching

Pipe Explorer entry and exit through hot tap fitting









Datatel Software Package

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Case Study – 24" River Crossings







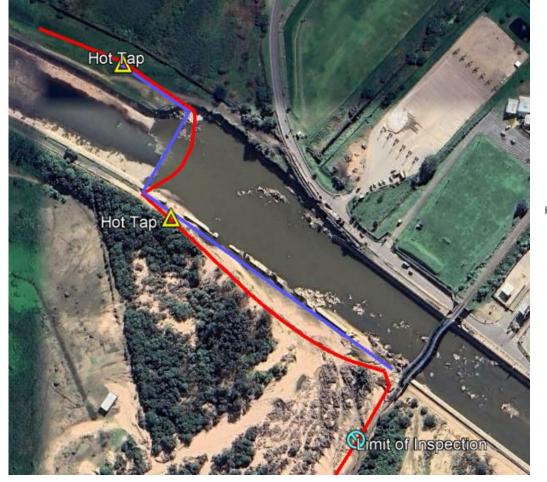
Case Study 1 – 24" River Crossing Results

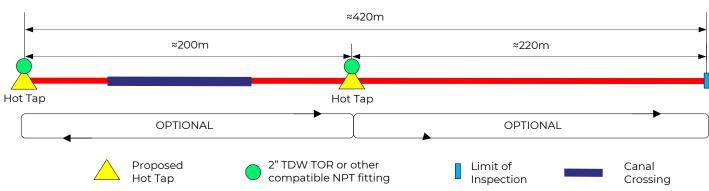
- Installed in the 1950's, but never inspected
- Took approximately 6 hours (each)
- Zero downtime
- Pipeline remained in service (50% bypass)
- 40bar operating pressure
- Redundant data scan



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Case Study 2 – Concept







Thank you.

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