

# A new angle

on solving unpiggable pipeline challenges



*How GE's SmartLaunch™ system made ILI possible beneath the streets of New York*

Theoretically, any pipeline can be modified to allow in-line inspection. Practically however, the costs of excavations and permanent installations have been, in most cases to date, exceedingly prohibitive. Even where traditional modifications are feasible from engineering and logistics perspectives, flow interruption may not be an option – either because they are critical supply lines or because the associated lost revenues could be nearly insurmountable.



GE imagination at work



Notwithstanding, prudent pipeline integrity managers know the safety and productivity issues that are at stake over the long term. They are also well aware of the accuracy and planning benefits that high-quality in-line inspection data offer over potentially supply-disrupting alternatives such as hydrostatic testing. Compounding all these pressures is the simple fact that many operators, particularly in the US, now face strict regulatory deadlines to assess the integrity of their yet-uninspected pipelines.

So, many pipeline operators and distribution companies are in dire need of ways to proceed with in-line inspections of their 'unpiggable' lines. But how – and at what cost?

*There can be nothing quick or simple about an operation of this type. Environmental and community safety, and uninterrupted flow are of paramount importance.*

#### New York City, autumn 2007

National Grid is one such company. Not yet facing regulatory deadline, but taking a proactive approach to integrity planning, National Grid contracted GE Oil & Gas – PII Pipeline Solutions to inspect its two-mile Backbone pipeline running under the busy streets of Brooklyn, New York, and under an East River tributary into Queens.

Natural gas flow could not be interrupted for extended periods of time and there were no existing launch or receive traps – essentially, there were no easy ways into this pipeline. Launch-site excavation had to be conducted near a busy traffic intersection with a population

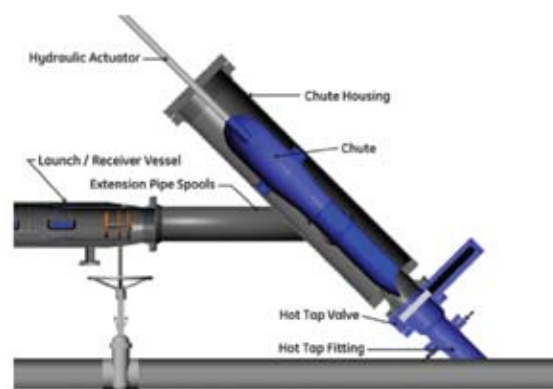
of nearly five million people pulsing around us. This environment was truly a High Consequence Area and exactly the kind of situation for which we created SmartLaunch.

#### The SmartLaunch solution

GE's system, which has a patent pending, utilizes an industry-standard angle hot-tapping process that leaves behind a stopple-type fitting that can be plugged and unplugged to facilitate installation of portable launch and retrieval spools to enable the current in-line inspection project and simplify future re-inspection.

To provide a manageable access point in restrictive environments (as was the case in Brooklyn and Queens), SmartLaunch's chute housings are installed temporarily to 45° angle split-tee fittings at both the launch and receive sites. Each housing incorporates a retractable chute that is hydraulically inserted through the angled fitting to ensure clean, safe passage of the ILI tools into and out of the operating pipeline. Equipment configuration enables use of conventional launchers and receivers as well as standard kicker pipe work to initiate inspection.

Designed for the most challenging settings, the SmartLaunch configuration requires that some very tight radius bends be navigated – including a 1D bend that cannot be passed by traditional ILI tools.



SmartLaunch chute configuration



Launch (L) and receive (R) sites were located in a High Consequence Area surrounded by busy auto traffic and densely populated residential and business districts.

Therefore, the system's companion SmartScan™ tool is employed – a multi-diameter MFL inspection technology introduced in 2004. The 20-26" SmartScan tool used on this project was accompanied by multi-diameter cleaning and caliper tools designed to share a common tow section for optimized efficiency.

#### From plan to action

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The entire project required two separate mobilizations. The first involved the hot tapping operation, which kicked off in October 2007. National Grid's crews began coordinating with state and city regulatory officials to manage excavation of the launch and receive sites. The crews did an exceptional job of mitigating logistical challenges associated with the proximal, dense residential areas. GE contracted with a third party to complete the six day hot tapping program, which included kicker piping access points. The second mobilization began in spring of 2008 with four flatbed trucks delivering launch and receive equipment to National Grid's workshop

where crews began precise assembly of the complex interconnect piping.

#### Inspection profile

The 24" Backbone pipeline's normal operating pressure of 276 psi (19 bar) had to be sustained for extended periods to insure the necessary flow rate needed for inline inspection. The client met this challenge by coordinating with gas control to secure adequate upstream supply and to control downstream demand. The line included numerous 1.5D bends, 22° mitre joints, and had been in operation since the early 1950s – but it had never been cleaned and inspected by an ILI tool.

Since this was a critical line and its internal condition was completely unknown, blockage risks were mitigated through an intensive



Post-inspection SmartScan tool.

cleaning regimen involving a series of runs by poly pigs, customized multi-diameter cleaning pigs and magnetizer cleaning pigs. Only when clear passage was certain, could the multi-diameter caliper and SmartScan tools be launched.

The metal loss and geometry inspections were completed successfully with no speed excursions or tool damage – and an excellent data set was acquired.

#### Conclusion

While SmartLaunch and SmartScan are designed to minimize labour and engineering time required for addressing unpiggable pipeline challenges, every project of this type must still be treated as a unique situation. The intrinsic physical limitations are always greatly compounded by the reality of unique site surroundings, multiple regulatory approval levels, safety considerations and zoning requirements. Pre-inspection planning, tight project management and a close client-crew working relationship are all crucial to success.

PII's crews have performed in-line inspections in every operating environment worldwide for more than 40 years. But this project was clearly one of the most demanding ever undertaken. As such, a number of valuable lessons were learned, with subsequent process and design improvements that will significantly

benefit future inspections for all our customers. For example, we have increased the efficiency of in-field equipment delivery procedures, designed layout improvements to minimize field welds to kicker, and gained even greater insights about the operational challenges that our customers face during the inspection process.

SmartLaunch will not be cost effective everywhere – it was designed for extraordinary circumstances. When both the stakes and obstacles are high, its unique combination of technologies and procedures will deliver the pipeline integrity knowledge needed to ensure long-term, reliable product supply. ■

*Sincere thanks to National Grid for their tremendous partnership on this project and for the kind permission to tell the story.*

#### Project cycle

##### Pre-inspection

1. Site survey
2. Design and manufacturing of 45° tee and kicker piping
3. Excavation
4. Quality assurance of tee welding procedures
5. In-service tee welding
6. Hot tap installation
7. Launch equipment and kicker pipe rigging

##### In-line

8. Cleaning
9. Filtration
10. Waste disposal
11. Caliper inspection
12. SmartScan inspection

##### Completion

13. Launch and receive equipment removal
14. Plug completion