Inspection of the natural gas underground pipework at an onshore gas terminal was required to confirm the integrity of the system.

Typically this would require full excavation, which in this instance would amount to approx. 34m including under site roads.

As a result alternative inspection techniques were considered through the ABB Risk Based Inspection (RBI) process. This ultimately led to the selection of LRUT, this long range Non-Destructive Testing (NDT) technique, utilises ultra-sonic sound waves to detect wall loss along a length of pipework. This allowed for only sections of the pipework requiring excavation.

**LRUT inspection technique**

LRUT is an ultra-sonic technique which has several variations available in the market under tradenames. All of them work on the principle of sending UT waves along a length of pipework and then sensing the signals which reflect / bounce back off features, such as: defects, welds, supports, elbows, flanges etc.

This is shown in diagram 1, which depicts (simplistically) the signals received by the LRUT equipment when a feature is detected.

**Solution**

ABB RBI review of the stabilised condensate underground pipework specified the use of Guided Wave Testing (GWT) to inspect for pipe wall thickness and any corrosion losses.

LRUT is a form of GWT and allows remote pipe wall thickness testing by attaching a collar that emits and receives ultrasonic sound waves down the pipework.

This piping system had no previous history of inspection therefore it was important to establish integrity given its relative age and high HSE consequence if a corrosion failure were to occur.

A certain amount of excavation was required to access the pipe and attach the test equipment (image 1 overleaf), however, significant sections of buried pipe could be tested with this technique to ensure integrity, including a section underneath a road crossing.

The inspection was planned and supervised by ABB to ensure correct coverage and safe execution. Favourable results were obtained from the testing to assure pipework integrity.
Estimated saving
Cost saving of not having to excavate the pipe completely (approx. 34m) including under road crossing and removal of protective coating: £25,000.

Benefits of the technique
- Inspection of long lengths of buried and none buried pipework to provide qualitative (%) wall loss information
- Can inspect around / through some pipework features (elbows, supports, welds)
- Applicable to a wide range of pipe diameters and schedules
- Once set up, significant meters of pipework can be inspected within minutes
- LRUT allows inspection both upstream and downstream of the collar simultaneously

Benefits delivered to client
- Qualitative inspection of buried pipework without the need to fully excavate
- Renewed confidence in the integrity of the buried pipework system