Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Nov 2013

Project Reference Number

NIA_NGGT0013

Project Registration

Project Title

Evaluation of Inspection Techniques for Sleeved Crossings

Project Reference Number

NIA_NGGT0013

Project Licensee(s)

National Gas Transmission PLC

Project Start

July 2013

Project Duration

0 years and 9 months

Nominated Project Contact(s)

Robert Stockley, box.GT.innovation@nationalgrid.com

Project Budget

£183,000.00

Summary

During a routine Inline Inspection (ILI) operation, a 16% metal loss feature was detected within a 40 metre long sleeved road crossing. In addition to the 16% metal loss feature, the inline inspection (ILI) also confirmed that the pipe section within the sleeve contains other metal loss features. An inspected was undertaken six years previously with no evidence of metal loss features in the pipe section located within the sleeved crossing.

Other than the Inline Inspection (ILI) technique, no other reliable technologies are currently available to inspect defects contained within sleeved sections of pipeline. This can lead to risk associated with accurately determining the period in which corrosion started to develop between Inline Inspections, and therefore the corrosion rate.

The suitability of alternative pipeline inspection systems, such as ultrasonic guided wave inspection system, for use as a complement to the Inline Inspection (ILI) technique is not fully understand at this time. Information gained from this study will provide a better understanding of the process involved with the inspection of pipeline areas where metal loss has been found during a standard Inline Inspection, currently scheduled at approximately 10-14 year intervals.

Third Party Collaborators

DNV

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

There is a need for suitable alternatives to the Inline Inspection (ILI) technique to detect metal loss on buried pipeline, particularly above-ground, non-invasive methods fit for purpose for inspecting sleeved crossings.

Method(s)

A sleeved section of pipeline is scheduled to be removed from service and replaced with thick wall pipe, in keeping with the latest requirements of procedure IGEM/TD/1 (Steel pipelines for high pressure gas transmission). It was recognized that this provides a valuable opportunity for learning. In order to obtain as much information as possible about the metal loss features and the potential inspection techniques being trialed during this study, a two stage feasibility study and research surrounding the removal of the sleeved section has been scheduled.

Stage 1 - Inspection of sleeved pipe section:

Four inspection companies will attend the site where pipeline is to be replaced and inspect the sleeved pipe section using above ground techniques prior to removal. The inspection of the pipe length will be performed using three ultrasonic guided wave systems supplied from each of the inspection companies.

Stage 2 - Pipeline/Sleeve Removal and Reporting results:

Following completion of the onsite inspection work, the orientation and cut locations will be marked onto the sleeve prior to removal. The sleeve and pipe will be taken to the research facility where they will remove the sleeve from the pipe in order to expose the areas of metal loss. These areas will then be recorded and compared to the onsite inspection results.

Scope

During a routine Inline Inspection (ILI) operation, a 16% metal loss feature was detected within a 40 metre long sleeved road crossing. In addition to the 16% metal loss feature, the inline inspection (ILI) also confirmed that the pipe section within the sleeve contains other metal loss features. An inspected was undertaken six years previously with no evidence of metal loss features in the pipe section located within the sleeved crossing.

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Objective(s)

The key objective is to evaluate a number of guided wave ultrasonic inspection techniques for their suitability in use on above ground inspection of sleeved pipe sections.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Information gathered on the guided wave ultrasonic systems trialed during this project will allow for an informed evaluation on the use of a non-invasive above ground inspection techniques on sleeved crossings as a complement to Inline Inspections (ILI's); following a review and update of relevant policy.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project will evaluate three ultrasonic guided wave inspection systems on a section of pipeline in the East area of the UK. A full

scale trial, as opposed to laboratory trials, on an isolated section of the network is necessary to fully evaluate the technologies in a field environment.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

Once the potential and fitness of purpose has been established for the three ultrasonic guided wave inspection systems, the technology can be used to inspect pipeline sleeves across the Gas Transmission Network.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£183k

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

A saving of ~£120k on future inspections on the one example section of pipeline.

Please provide a calculation of the expected benefits the Solution

Currently ILI technique is the only option available to National Grid to inspect sleeved crossings. ILI's are scheduled at approximately 10-14 year intervals, additional ILI's on the 163 pipeline sections of NTS would cost on average, a minimum of £100k per inspection and involve operational disruption to the network.

One NTS pipeline in East Anglia is 64.5km long and has approximately 130 sleeves along its length. Because of its length, it is anticipated that the costs to In-Line Inspect this pipeline, it be approximately £140k to £160k.

Compared to the estimated cost of £20k for a non-invasive ultrasonic guided wave system of inspection, a savings of at least £120k for this section alone could be realised. There is active corrosion within the sleeves and therefore a reliable inspection technique is required to identify the vulnerable sleeves.

A reliable above ground method of detection and tracking of corrosion levels on sleeved crossings could also prevent the unnecessary removal and replacement of pipe section (an estimated cost for this process is ~£600k). There are also safety benefits to consider. Guided wave ultrasonics could:

- Allow for inspection of pipeline sections that are unpiggable and therefore do not currently undergo ILI.

- Reduction of the risk of pipeline failure based on detection of metal loss features before they reach critical levels.

Please provide an estimate of how replicable the Method is across GB

A reliable above-ground inspection method for detection and tracking of corrosion levels on sleeved crossings can be utilized across the Gas Transmission Network. Having a complimentary technique to Inline Inspection (ILI) will provide potential for early corrosion detection and thereby the prevention for the unnecessary removal and replacement of pipe sections on the NTS.

Please provide an outline of the costs of rolling out the Method across GB.

There is an estimated cost of £20k for a non-invasive ultrasonic guided wave system of inspection per sleeve.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☑ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

n/a

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

This research and evaluation project sits within Infrastructure under the Safety theme. This project is also linked to the New Materials and Technologies area under the Strategic theme.

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

n/a

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

n/a

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

n/a

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

n/a

This project has been approved by a senior member of staff

☑ Yes