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NIA Project Registration and PEA Document

Date of Submission

Oct 2016

Project Reference Number

NIA_WWU_040

Project Registration

Project Title

>7 bar Permanent Leak Repair Clamps

Project Reference Number

NIA_WWU_040

Project Licensee(s)

Wales & West Utilities

Project Start

October 2016

Project Duration

2 years and 2 months

Nominated Project Contact(s)

Darren Cushen (Asset Officer)

Project Budget

£100,000.00

Summary

The project is broken into 4 main phases which will each be completed in turn. The project will provide a report detailing the outcomes of the literature review & a review of industry best practice, produce a gap analysis, deliver a working risk assessment model and produce a leak repair methodology in a format to be agreed.

The first phase will look at the use of leakage repair methods used in the gas industry on a global scale focusing on 2 separate pressure ranges 7-16 bar and 16-80 bar.

The second phase will evaluate the clamps used by WWU against the findings of phase 1. A gap analysis will be carried out to ascertain current practices versus industry best practices defined in phase 1.

The third phase uses the two previous phases to carry out a cost based analysis and produce a risk assessment/process that WWU can utilise in determining the suitability of setting an operating life of a leak repair clamp. The failure modes of the clamps will be looked at and classified as catastrophic or minor with further assessment of the catastrophic failures being conducted. The costs of the repairs to the clamps will be determined and a pre and post failure risk assessment of the consequences will be carried out. A database of the failure mode and repair type is to be built to use as a reference when failures occur. This will help WWU to assess the potential to reduce costs of repairs, thus reducing/eliminating the risk associated with hot works

The fourth phase will look at the development of repair manuals, which detail steps WWU can utilise in the event of a failure on a fitted leak repair clamp.

The project will be managed through a stage gate approach.

Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

Problem Being Solved

Wales & West Utilities (WWU) operates approx. 2,300 km out of 20,000 km of major accident hazard gas pipelines within the UK. Current methods of repairing a leak on a HP pipeline involve the use of temporary repair clamps. These clamps need to be replaced with a permanent repair, usually within 12 months via a short diversion. As of yet there are no permanent leak repair clamps in use. The ability to use the clamps as a permanent solution or beyond the 12 months stated in P11, could have the potential to reduce costs associated with repairs to HP pipelines.

Method(s)

This project will undertake proof of concept validation and looks to address the following key areas:

- Phase I: Review of the leak repair clamps and their use in other gas industries worldwide focusing on pressure ranges of 7 - 16 bar and 16 - 80 bar.
- Phase II: Review of the types of clamps used by WWU and based on the outcome of Phase I confirm their appropriateness in being used for varying durations.
- Phase III: Based on phase I & II, carry out a cost based analysis and develop a risk assessment/process which WWU can utilise in assessing the suitability of setting an operating life of a leak repair clamp.
- Phase IV: Develop repair manuals, which is a set of steps that WWU can utilise in the event of a failure of a fitted leak repair clamp.

Scope

The project is broken into 4 main phases which will each be completed in turn. The project will provide a report detailing the outcomes of the literature review & a review of industry best practice, produce a gap analysis, deliver a working risk assessment model and produce a leak repair methodology in a format to be agreed.

The first phase will look at the use of leakage repair methods used in the gas industry on a global scale focusing on 2 separate pressure ranges 7-16 bar and 16-80 bar.

The second phase will evaluate the clamps used by WWU against the findings of phase 1. A gap analysis will be carried out to ascertain current practices versus industry best practices defined in phase 1.

The third phase uses the two previous phases to carry out a cost based analysis and produce a risk assessment/process that WWU can utilise in determining the suitability of setting an operating life of a leak repair clamp. The failure modes of the clamps will be looked at and classified as catastrophic or minor with further assessment of the catastrophic failures being conducted. The costs of the repairs to the clamps will be determined and a pre and post failure risk assessment of the consequences will be carried out. A database of the failure mode and repair type is to be built to use as a reference when failures occur. This will help WWU to assess the potential to reduce costs of repairs, thus reducing/eliminating the risk associated with hot works

The fourth phase will look at the development of repair manuals, which detail steps WWU can utilise in the event of a failure on a fitted leak repair clamp.

The project will be managed through a stage gate approach.

Objective(s)

This project will provide the understanding needed to enhance the procedure for the repair of leaks on the above 7 bar pipeline network to deliver a lower cost and lower risk solution.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will collect a body of evidence to support:

1. A fuller understanding of the failure modes and consequences of temporary leak clamps.
2. A risk assessment/process to extend the operating life of temporary leak clamps.

Project Partners and External Funding

Wales & West Utilities
Cadent

IRM Systems who will develop a risk assessment which would allow the networks to evaluate the risk of using a leak repair clamp for durations longer than 12 months, or shorter than 12 months if appropriate.

The project will be wholly funded using the Network Innovation Allowance incentive.

Potential for New Learning

The failure modes of temporary leak clamps will be determined at different pressures and diameters for HP pipelines. The information can be used across the different gas networks within the UK.

Scale of Project

The project will be split in 4 phases:

- Phase I: Review of the leak repair clamps and their use in other gas industries worldwide focusing on pressure ranges of 7 - 16 bar and 16 - 80 bar.
- Phase II: Review of the types of clamps used by WWU and based on the outcome of Phase I confirm their appropriateness in being used for varying frequencies.
- Phase III: Based on phase I & II, carry out a cost based analysis and develop a risk assessment/process which can be utilised in assessing the suitability of setting an operating life of a leak repair clamp.
- Phase IV: Develop repair manuals, which is a set of steps that WWU can be utilised in the effect of a failure of a fitted leak repair clamp.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The project will initially focus on Wales and the West of England but the information gathered can then be used across the UK. Cadent have joined the project in Phases III and IV.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The total investment into this project is £100,000. This is made up of an external cost of £80,000 and an internal cost of £20,000.

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)

Whilst this is a research project, that would require further project phases to realise a true saving we believe there are potential savings to be made if this project successfully identifies permanent leak repair methods.

The costs saved by using repair clamps or another type of permanent leakage repair could potentially save between £1,639 – £5,000 per leak per year (over an assumed 45 year life of the asset). This could potentially save between £100k - £300k to replace each repair clamp. A number of different factors may have an impact on the decision. The pressure at which the pipeline operates, the diameter and the area in which the pipeline operates will be major factors to consider.

Depending on the outcome of the research on the potential failure modes, there are a number of different situations to be considered. Should the research determine that the leakage clamps be run to failure the need for costly diversion may be eliminated. The cost of these diversions can often be in the region of £100k - £300k and with 4 leaks identified in the last 2 years in WWU, there is the possibility for substantial savings if a run to failure approach can be adopted. Should the project determine that the operational life of leak clamps can be extended the savings associated with the deferral of diversion works will be dependent on the newly determined life cycle of the clamps. A leak on a WWU pipeline which resulted in a 60 m diversion of 6" HP pipe being completed earlier this year cost WWU approx. £275,000, which could have potentially been avoided had a permanent leak clamp been available.

Please provide a calculation of the expected benefits the Solution

This is a research project

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

This is a research project

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

This project only looks at the potential to extend the operating life of temporary leakage clamps, a roll out across the UK is not part of the project scope.

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

The information collected through the project will be directly applicable to other gas distribution networks, in terms of assessing the appropriateness of extending the operating life of temporary leak clamps beyond the maximum 12 months stated in P11. The use of temporary leak clamps is consistent across the other GDN's within the UK.

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

n/a

- 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.

T/PR/P11 is an industry wide document that outlines the inspection and repair of damaged steel pipelines designed to operate at pressures greater than 2 bar. To the best of our knowledge there are no other projects considering the potential of extending the operating life of temporary leakage clamps.

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