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Quarterly Report

Date of Report: 15 April 2007

Contract Number: DTPH56-05-T-0003

Prepared for: United States Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Office of Pipeline Safety

Project Title: "Consolidated Research and Development Program to Assess the Structural Significance of Pipeline Corrosion"

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For quarterly period ending: 31 March 2007

Progress to Date

The technical status of the project as detailed at the end of the last quarter was as follows:

A literature review to ascertain if there is useful information in the public domain regarding stress concentration factors (SCFs) of corrosion defects in pipelines has been completed.

Three dimensional linear elastic finite element model construction for 36-inch diameter (914.4 mm) x ½-inch wall thickness, t (12.7 mm) pipe with $((D/t)$ ratios of 40, 72 and 100) has also been completed. In each case, the pipe is subjected to internal pressure loading and a pressure end load to represent an end force on the pipe. This is consistent with the FE analyses undertaken for other corrosion projects performed for PRCI an in the broader industry. Corrosion damage in the form of grooves orientated both axially and circumferentially has been modeled. Defect depths of 20%, 40%, 60% and 80% of the wall thickness have been considered.

Full scale testing has been completed on 12-inch diameter pipe (8.4 mm wall thickness) of material grade X52. Defects (type, depth, d , and axial length and circumferential width, L and W respectively, and blend radius, r) were chosen to compliment the aforementioned FE studies, and agreed with the PRCI project team. The test pipe (11.8 m length) was machined to include 4 metal loss defects to simulate corrosion:

Defect 1: groove, $d/t=20\%$, $L=400$ mm, $r=8.5$ mm ($W=10.1$ mm)*

Defect 2: groove, $d/t=40\%$, $L=400$ mm, $r=8.5$ mm ($W=13.5$ mm)*

Defect 3: groove, $d/t=60\%$, $L=400$ mm, $r=8.5$ mm ($W=15.5$ mm)*

Defect 4: patch, $d/t=60\%$, $L=400$ mm, $r=8.5$ mm ($W=140$ mm)

Notes: * W is dependent on defect depth and blend radius (r).

An interim draft report describing the results of the work has now been issued to DOT and PRCI. Review comments have been received from the PRCI project team and are currently being addressed. Advantica has also been trying to locate 12-inch diameter grade X65 pipe for further testing. PRCI have tentatively indicated that pipe has been located in the UK that could be used for the test program. Approval is currently being sought from the operator to release the pipe for the test program.

Payable Milestones

The following payable milestones were completed during this reporting period:

- Sixth Quarterly Status Report Submitted