

Ninth Quarterly Report September – November 2015

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Contract Number: DTPH56-13-T-000008

Prepared for: *Pipeline and Hazardous Materials Safety Administration, TransCanada Pipeline, Enbridge Pipeline, and PRCI*

Project Title: “In-Ditch Validation Methodology for Determination of Defect Sizing”

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Project Status

Item 33 – Field trials of the integrated system.

One sets of field data was acquired in the 9th quarter and was used to test the system.

- A field trial was completed in North Dakota on ERW pipe with multiple detected ILI anomalies in individual joints. The ERW long seam was scanned for two joints in two separate digs, with 100+ anomalies identified in each of the two digs. Most of these anomalies are non-surface breaking upturned fiber indications, many were non-thru wall cold welds, some were hook cracks, and a few were laminations. The results have not been compared to any other information such as metallurgical freeze-breaks or ILI data.

Item 41 – Develop a written inspection procedure for Implementation of field application software.

A written inspection procedure has been written for the IWEX inspections. It is expected this will be a dynamic document which will be updated as improvements to the equipment and procedures occur during system development.

Item 42 – Equipment - IWEX unit for Kiefner Metallurgical Lab for Evaluating IWEX performance under laboratory conditions.

The IWEX unit to be delivered to the Kiefner lab has not been finished. In recent communications with Applus RTD in Rotterdam the unit is almost finished. It is expected the unit will be delivered by the end of the year.

To fulfill the scanning needs at Kiefner's metallurgical lab the research unit that was used during the past two years has been loaned to Kiefner on a temporary basis.

Item 43 – In-Kind Purchase of IWEX units for Evaluation of IWEX performance under field conditions.

Two units were purchased for use by the Houston office for field trials. Both of these units have been delivered and one of these units has been used for trials, such as the field trial identified in item 33.

Item 44 – Develop a training program to perform inspections for Evaluation of IWEX performance under field conditions.

A training program for using IWEX has been developed. It consists of 5 modules 1) theory, 2) modes, 3) signal processing, 4) software, hardware, & scanning, 5) viewer software and sizing.

Item 45 – Parameter study to find which parameters influence the IWEX image the most.

A parameter study was started to determine the effect of various parameters on alignment and focusing of the IWEX images. The parameters to be studied are effects from the wedges, probe center separation and offset, the curvature of the pipe, and the mechanical alignment of the system. This study was initiated in the 9th quarter, but is not complete. We hope this study can be completed in the 10th quarter, but this will put us behind on one of the primary tasks of the project for improving sizing of defects.

Item 46 – Develop and test enhanced IWEX data acquisition routines to determine wall thickness variations.

The main development task proposed in the modification was to study wall thickness variations in three different items in the proposal. Since the proposal was written it was decided that other parameters could also have an effect on image alignment and focusing, some of the wall thickness variation studies were converted to more general parameter studies. This item is the only remaining study of wall thickness variations and was initiated in the 9th quarter.

Item 47 – Coordinate In-Kind Field and lab testing with enhanced data acquisition.

Because of the multiple parameter studies, an attempt to better coordinate the field trials with the data parameter studies was initiated. Results are coordination the first study on ERW seams with parameter studies. Some of the full matrix capture data obtained from the in-kind trials has been shared with Rotterdam for the parameter studies. Opportunities for additional in-kind IWEX data acquisition are being pursued.

Item 48 – Develop 3D & 2D GUI to display the IWEX data.

An initial piece of software was written to put the IWEX data into a 3D and 2D graphical user interface. This initial effort has resulted in a separate program that can display the data similar to the existing IWEX viewer. The results complete the described item but should be

considered preliminary as they are a test bed on which to develop automated feature detection, interpretation and sizing.

Item 50 – Develop Inversion scheme (Matlab).

The tasks to develop an inversion scheme which has the potential to provide better aligned and focused images was initiated in the 9th quarter. This initial inversion scheme is not complete and should be completed in the 10th quarter.