

Tenth Quarterly Report December – February 2016

Date of Report: *March 2, 2016*

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 34 – Field trials of the integrated system.

Trials of the system continue in the current quarter. These trials have been occurring in the Applus RTD office in Houston, Texas and at Kiefner’s metallurgical lab in Columbus, Ohio. Trials in Houston have been on a 12-in ERW pipe with existing and manufactured defects in the seam. Trials in Columbus have been on 16-in EFW pipe from the DOT PHMSA Comprehensive Study to Understand Longitudinal ERW Seam Failures being conducted by Battelle. The scanner continues to work well and improvements have focused on better probe holders to eliminate some of the errors caused by unwanted probe movement during scanning.

Item 35, 36, & 37 – Prepare Draft, Address Comments, and Issue Public Version of Phase-1 Report.

The Phase 1 report is in progress and will be issued in March. A public version of the report should follow in April.

Item 50 – Develop Inversion scheme (Matlab).

The item to develop an inversion scheme has progressed but is not yet complete. An overview of this initial result which must still be validated (Item 59).

Item 52 – In-kind Purchase of IWEX units for Evaluation of IWEX performance under field conditions.

An additional pair of IWEX units was planned for the project as an in-kind contribution to the project. This will bring the total of IWEX units in North America to 5. Currently these additional units have not been necessary for the number of scans occurring. These units are ready and available in Rotterdam and can be delivered upon project need.

Items 45, 46, and 53 – Parameter study to find which parameters influence the IWEX image the most. – Develop and test enhanced IWEX data acquisition routines to determine wall thickness variations. – Develop and test routines to accommodate for the most important parameters.

These parameter studies and support tasks are on hold pending availability of Rotterdam physicists. A customer project has temporarily constrained internal resources and we expect Rotterdam staff to return to this PHMSA project in mid-March.

Item 54 – 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. The result is to coordinate trials 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.

An effort to compare SCC coupons with IWEX data has been delayed one quarter by the customer until March or April. The SCC coupons will have CT scans performed and should lead to 3-D comparisons between IWEX and the CT scans.

In-kind 8-in ERW laboratory trials are in progress at the Kiefner lab. This consists of testing 6 to 8 pipe pups with probable ERW seam anomalies. Data acquisition for these trials should be completed in early March.

We met with an operator in February in an effort to convince them to remove a pipe from service that was scanned last year. The IWEX images have been interpreted as a hook crack with fatigue. The anomaly has been repaired and is under a sleeve and consequently is no longer an integrity threat, but the chance to identify a fatigue crack grown in service is of significant interest to this project and the operator. The operator appears very interested, but the pipe is in a difficult position to remove and may take some time (6 months to 2-years) to remove. If removed we would like to rescan with improved alignment and focusing then examine the defect metallographically. It should be noted the interpretation is still uncertain. A fatigue crack originating in the bottom of a hook crack must be imaged with multiple different IWEX modes, in this case 3. If these modes are miss-aligned, then the location of the parts of the apparent hook crack with fatigue will also be miss-aligned and the interpretation of the image could change. The image appears promising from a project R&D perspective however the reader should be cautious at this time until more information can be acquired.

In-kind trials on 30-in FW trials are planned for the 11th quarter. The pipes are in Houston and the scans should be available for testing in March.

Item 55 – Develop 3D & 2D GUI to display the IWEX data

This project was initiated in Q9 and has progressed well in this quarter. A graphical user interface (GUI) has been developed that looks very similar to the LabView program that is currently in use so there will be minimal impact to the user. The GUI is at a point where it can be considered functionally complete; however, we will continue to improve the GUI as it relates to Task 15.

Item 56 – Develop SQL storage of the feature data

The SQL data model has been created and is being used by the AutoDetect routine to save, load and display features for the GUI.

Item 57 – Develop module to merge 1-inch wide scans into a continuous dataset by calculating the offsets (and overlap) to be able to render it as a continuous image.

The ‘offset’ table in the SQL data model contains information for merging scans. This table allows the user to specify a 3D shift for every scan in the IWEX data file. The merge function has been tested on the same data with synthetic offsets.

Item 59 – Validate inversion method.

The items for task 16 to develop an inversion algorithm made some progress however tasks are behind schedule (similar items 45, 46, and 53) due to resource constraints. Similar to items in task 14, we expect progress to pick-up in April and complete by proposed contract end date.