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QUARTERLY REPORT – PUBLIC PAGE

Investigate Fundamentals and Performance Improvements of Current In-Line Inspection Technologies for Mechanical Damage Detection

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

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Milestone and Deliverable Accomplishments this Reporting Period

Task No.	Task	Scheduled Completion Date	Completed Date	Milestone
B-3.3	Data Analysis and Operator Validation	4/30/2007	4/30/2007	MS
B-3.2	Data Analysis- Critical Comparisons	4/30/2007	4/30/2007	MS
B-7.1	Project Review Meeting	4/30/2007	4/30/2007	MS
B-7.2	Reporting/Meetings-Phase I recommendations	4/30/2007	4/30/2007	MS
B-8.1	Third Quarterly Status Report	4/30/2007	4/30/2007	MS

Technical Status

The team provided data format requirements to pipeline operators who indicated their desire to contribute mechanical damage data to the project. Data was requested to be delivered by end of February. One liquid operator and a second gas operator volunteered to review the data requirements indicated in the example format and provide mechanical damage validation data.

The operators delivered mechanical damage field verification dig data to the Project. This data was analyzed and the results are being incorporated into the Phase I report.

The Phase I report summarizes the findings of the work completed to date (Tasks B-1, B-2, and B-3). This report will be circulated to the Project participating vendors for approval prior to the Task 7.2, Phase I meeting.

The Project has met all milestones to date. On March 28, 2007 a project peer review was conducted by PHMSA per the OMB requirements. Peer review was intended to uncover any technical problems or unsolved issues in a scientific work product through the use of technically competent and independent (objective) experts. Blade Energy prepared the peer review presentation and attended the review via remote link.

Results and Conclusions

The research has identified three categories of technologies currently employed for the detection and discrimination of deformations (dents) in pipelines associated with mechanical damage:

- Direct Arm Measuring Calipers
- Direct Arm Measuring Calipers augmented with Electromagnetic Sensors
- Indirect Measuring Electromagnetic Calipers
- MFL (3 axis Hall Effect)

The research has identified several approaches reported by the participating vendors for the detection, discrimination and measurement of coincident damage within deformations such as metal loss, corrosion, gouges or cracks. Additionally, technologies were identified with claimed capability to discriminate gouges from corrosion in the body of pipe where no associated deformation is present. The categories of coincident damage sensing technology are:

- MFL- Longitudinal or Circumferential Saturated Fields, single axis, two axis and three axis Hall Effect sensors and residual field sensors.
- Ultrasonic Sensors

All of the participating vendors reported that current mechanical damage assessment involves the integration of data from deformation and coincident damage sensors and other data such as inertial sensors. Final discrimination is highly dependent on manual interpretation of the combined data by experienced data analysts with extensive experience in the development of mechanical damage discrimination process developed by the vendors.

Validation data was made available from the participating vendors for a majority of the identified mechanical damage technologies. Results were compared with validations performed by one liquid pipeline and two gas pipeline for several of the identified sensing technologies. Analysis of the data concluded that laboratory pull tests of a direct measurement deformation technology with electromagnetic proximity sensors represent a statistically valid sample from which conclusions may be drawn regarding process capability. Direct Measuring Arm Calipers validation data obtained from direct examination excavations did not provide of suitable quality for use in integrity assessment. The use of 3 axis hall sensors to detect dents, measure depth, length and width as well as detect and discriminate coincident damage showed promise but validation data provided for this technology was from direct arm measuring caliper. While the three axis MFL technology shows promising results based on sound principles, reliable validation data for direct arm measurement caliper data is required to provide for performance benchmark for use in integrity assessments. Therefore, the research is preparing a recommendation and specification for further testing and data gathering to be conducted within Phase II of this project.

Schedule

The Project has met all milestones to date.

Issues, Problems or Challenges

Phase I report will be issued for comment to the participating ILI vendors, no provision was made in the schedule regarding timing for return of comments and schedule for Phase I report meeting. Blade Energy will work with PRCI to schedule these activities.

Plans for Future Activity

Obtain participating vendor comments and finalize additional testing for repeatability and reliability for Phase II. Definitive estimates for testing and data collection will be obtained and presented to the Project team with the additional testing scheduled to begin August 1, 2007.