

## QUARTERLY REPORT – PUBLIC PAGE

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

*Date of Report:* January 31, 2008

*Contract No:* DTPH56-06-000016

*Prepared For:* United States Department of Transportation  
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Office of Pipeline Safety

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*For Period Ending:* January 31, 2008



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## **Technical Status**

The Phase I report is complete and comments have been received from several member companies. The team is scheduling a project review meeting prior to final approval and issue of the Phase I report. The meeting will be conducted in either February or March 2008.

Project A, within DTPH56-06-T-000016, fabricated a sample of 30 inch NPS x 3 meters line-pipe with 13 manufactured mechanical damage features. The recommendations for Phase II testing included the detailed direct measurement of these mechanical damage features. The Project A technology incorporates one of the current caliper technologies studied within the current research (Phase I) of this project.

Laboratory tests were completed on Tasks B-5.1 and B-6.1. This included the testing to investigate repeatability and reliability of select technologies, and the initiation of laboratory/field tests to investigate and validate Type I and II error of select technologies. Blade performed detailed measurements of the manufactured mechanical damage features in September 2007. Data from multiple caliper pulls performed in Nov-Dec 2007 were evaluated against the caliper inspection tool to identify refined caliper performance.

## **Results and Conclusions**

The Phase I report is currently under review and no new results have been added at this time. It is expected that the report will be completed by the end of March 2008. Once the report has been completely reviewed and revised it will be released to the DOT.

Laboratory tests for Tasks B-5.1 and B-6.1 consisting of confirmatory direct measurements of manufactured dent features and pull tests from one of the selected current mechanical damage inspection technologies were completed.

In-line inspection technology measures the profiles based on measurements of the internal pipe surface. Validation measurements in the field are always based on direct measurements from the outside pipe surface. This research has integrated the laser profile validation measurements from the inside and outside diameter surfaces.

These integrated profiles will be compared to conventional bridging bar validation measurements of dent profile taken from the outside surface for comparison with the laser validation measurements and profile data obtained during the laboratory pull test of the caliper technology. This comparison and analysis will be performed within the Data Analysis Phase.

Another important component of this milestone phase gathered data from a field trial incorporating the same caliper technology (G) used in the laboratory pull test. The aim of the work from this milestone is to evaluate validation errors and bias from in-ditch evaluation and gauge their effect on characterizing and comparing actual performance as determined under laboratory conditions. Availability of the field trial results within the next milestone phase will provide a basis for further evaluation of MFL based Technology E.

**Schedule**

<b>Item No.</b>	<b>Task No.</b>	<b>Task</b>	<b>Status</b>
1	B-2.1	Data Collection – Develop detailed process review	Complete
2	B-1	Company Participation – Finalize participants	Complete
3	B-2.2	Data Collection – Vendor interviews	Complete
4	B-8.1	Management – Project administration and status reporting	Complete
5	B-3.1	Data Analysis – Develop performance measures	Complete
6	B-2.2	Data Collection – Vendor interviews	Complete
7	B-3.2	Data Analysis – Critical comparisons	Complete
8	B-3.3	Data Analysis – Operator validations	Complete
9	B-7.1	Reporting/Meetings – Project review meeting	Complete
10	B-8.1	Management – Project administration and status reporting	Complete
11	B-3.2	Data Analysis – Critical comparisons	Complete
12	B-7.2	Reporting/Meetings – Phase I report & Phase II recommendations	Complete
13	B-7.1	Reporting/Meetings – Project review meeting	Complete
14	B-8.1	Management – Project administration and status reporting	Complete
15	B-7.2	Reporting/Meetings – Phase I report & Phase II recommendations	Complete
16	B-4	Supplemental Testing - Confirm activities	Complete
17	B-8.1	Management – Project administration and status reporting	Complete
18	B-5.1	Reliability Studies – Testing	Complete
19	B-6.1	Validation Tests – Laboratory/field tests	Complete
20	B-7.1	Reporting/Meetings – Project review meeting	Complete
21	B-8.1	Management – Project administration and status reporting	Complete
22	B-5.1	Reliability Studies - Testing	Complete
23	B-6.1	Validation Tests – Laboratory/field tests	Complete
24	B-5.2	Reliability Studies- Data analysis	Planned
25	B-6.2	Validation Tests- Data analysis	Planned
26	B-8.1	Management – Project administration and status reporting	On-going
27	B-5.2	Reliability Studies- Data analysis	Planned
28	B-6.2	Validation Tests- Data analysis	Planned
29	B-7.1	Reporting/Meetings – Project review meeting	Planned
30	B-8.1	Management – Project administration and status reporting	On-going
31	B-7.1	Reporting/Meetings – Project review meeting	Planned
32	B-7.3	Reporting/Meetings – Final report	Planned
33	B-8.1	Management – Project administration and status reporting	On-going
34	B-7.4	Reporting/Meetings – Public presentation	Planned
35	B-8.2	Management – Annual peer review	Complete
36	B-8.2	Management – Annual peer review	Planned

**Plans for Future Activity**

Depending upon available schedule and budget resources, the pull through segment may be made available to the other participating technologies for comparison tests.

Project A was anticipated to run the newly developed dual-field tool with a 30-inch pipeline in late 2007. This new ILI tool will have incorporated, within the vehicle, the DAMC(EM) technology G. Detailed validation excavations will be conducted by the Pipeline Operator in 2008. Direct examinations would be conducted considering the controls and protocols developed from the detailed mechanical damage feature mapping together with the caliper technology pull tests. This data will allow for critical comparisons between technologies and would be conducted from evaluation of predicted measurements (prior to excavations and thus negating re-bounce effects) and control of validation measurement error. As with the above ground testing, only one size of inspection tools could be accommodated with this trial pipeline approach, but from the bias observed in the operators' databases it has been concluded that a full understanding of performances and tolerances for current technologies may not be possible from continued data mining alone. Technology E (three axis Hall Sensor) provides a technically unique approach to detection and discrimination of mechanical damage limited to geometric changes (dents and local changes). With a complete understanding of the population of mechanical damage in the 30-inch trial pipeline, the other technologies will be invited to run their mechanical damage technologies in that pipeline segment, with first priority being Technology E. In this way a true system performance for dent measurement can be validated for Technology E (using Technology G data) as well as POD, POI and POFC for Technology E.

As an alternative, the Project is considering making the 30 inch test piece available for laboratory pull tests for all the current mechanical damage technologies identified in Phase I of this research. This alternative and its potential impact to schedule and budget will be discussed with the Project Team during a February project status meeting.