Quarterly Report – Public Page

Date of Report: *March 15, 2007*

Contract Number: *DTPH56-06-T-000019*

Prepared for: *DOT PHMSA*

Project Title: *Augmenting MFL Tools with Sensors That Assess Coating Condition*

Prepared by: *Battelle and FBS Inc.*

Contact Information: *J. Bruce Nestleroth nesetlero@battelle.org 614-424-3181*

For quarterly period ending: *March 15, 2007*

Progress to date:

The goal of this project is to add sensors for coating assessment to a typical in-line inspection tool. These sensors will help pipeline owners assess the general health of the external coating that is protecting their pipeline system. External coatings are routinely used to protect transmission pipelines from corrosion; however these coatings degrade over time and can be damaged by outside forces including earth movement and excavation equipment. To detect metal loss corrosion defects, transmission pipeline operators often inspect their pipelines with magnetic flux leakage (MFL) in-line inspection tools. While most defects detected are benign to the operation of the pipeline, the few metal loss defects that affect the integrity of the pipeline remain a concern. Unfortunately, MFL corrosion surveys only find the result of the problem (corrosion), not the source of the problem (coating failure). Stress corrosion cracks (SCC), which occur at coating disbonds, can be detected using ultrasonic in-line inspection technology. Unfortunately, the cost to inspect for SCC is high, and inspections are usually conducted on pipelines with a higher probability of cracking based on soil models, cathodic protection assessment, bellhole inspections, and related data. Accurate detection of disbonded coating can help to indicate future conditions that may lead to the corrosion of the pipeline. The sensors that will be developed on this project would not add substantial cost or complexity to a normal MFL survey. The technology could help justify reinspection intervals based on the fact that the corrosion threat has been properly addressed (MFL in-line inspection) and the threat mitigation method (the coating) has been verified.

In this second quarter, a model to predict the sensitivity of sensor implementations to detect disbonds has been established. Based on the theoretical and numerical modeling completed to date, it has been determined that the first SH-wave mode is sensitive to coating disbond regions. Coating presence produces increased attenuation and decreased velocity of this mode, with attenuation increasing nearly linearly with frequency. Calculations were verified on using pipe samples used on the prior PRCI project. The limitations of the prior PRCI development could be explained using the results of the model.