

## QUARTERLY REPORT – PUBLIC PAGE

### Development of Dual Field MFL Inspection Technology to Detect Mechanical Damage

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## **Technical Status**

### **Pull Tests:**

Pull tests of the dual field tool were performed in two pipe sections, one provided by Enbridge and the other a pipe section dented by Battelle; the pull test setup and feature layout are described in the previous monthly report.

For these initial pull tests, the low and high field levels measured as the tool travelled through the Enbridge section of pipe were higher than the field levels specified by Battelle. The most useful pull test data was achieved in the Battelle dented section of pipe at a speed of 0.5 m/s with a measured low field level of approximately 6 kA/m which is slightly higher than the upper limit of 5.6 kA/m as specified by Battelle/PRCI. Because the field level is close to that specified, pull test data from the section of pipe dented by Battelle was used for testing the signal search algorithms.

Completion of the pull tests at the specified field levels was delayed by tool scheduling issues, thus delaying technical progress. The pull test will be completed in February before the inspection so that the specified field levels are recorded as the tool travels through the section of pipe supplied by Enbridge for the pull tests; the pull tests will be performed at four speeds ranging from approximately 0.5 - 1.7 m/s.

### **Software and Algorithm Development:**

After testing the scaling algorithm it was found that the results returned by the scaling algorithm did not correspond to the scaling algorithm results found by Battelle for identical high and low field levels. The scaling algorithm was based on finite element data provided by Battelle, however the final scaling factor produced was highly sensitive to the coefficients in the polynomial functions fit to the data. It was difficult to determine what functions Battelle had used, but after recently receiving a spreadsheet with these functions from Battelle this difficulty should be resolved.

After further discussion with Battelle it was also determined that there should be a single scaling factor for each length of pipe of uniform wall thickness and magnetic properties, rather than a separate scaling factor for each individual dent.

Work continues on the signal search algorithm and classification algorithms based on the preliminary data from the pull tests described above, and after discussions with Battelle it was determined that the values of the amplitudes used in defect classification decision points may need to be modified based on final pull test and inspection results.

## **Results and Conclusions**

Due to the fact that pull tests were not completed at the specified field levels no final results and conclusion are available.

**Schedule**

The pull tests will take place in February, and the Enbridge pipeline inspection will likely be in March.

**Plans for Future Activity**

Pull tests will be completed in February and the inspection will likely take place in March.