

Quarterly Report

Public Page

Date of Report: *December 31, 2014*

Contract Number: *DTPH56-14-H-00003*

Prepared for: *Government Agency: DOT*

Project Title: *Strain-based design and assessment in critical areas of pipeline systems with realistic anomalies*

Prepared by: *Center for Reliable Energy Systems (CRES), C-FER, NIST, and CANMET*

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For quarterly period ending: *December 31, 2014*

1 Work Completed in this Quarter

Most pipes (12" and 24" OD) for the full-scale tests have been procured or donated. Weld and specimen fabrication for the full-scale tests is in progress along with welding of the pipes for the curved wide plate tests (CWP).

Finite element analyses (FEA) for pipes with different anomalies (i.e., transition welds, corrosion defects, and dents) were continued. The focus was to (1) support the development of the specimen dimensions and instrumentation plans and (2) study the relative importance of different parameters and identify the controlling parameters.

We continued and completed the studies on the effect of pipe-to-pipe strength variation on the tensile strain design. The strength variation was found to have a great effect on the strain demand. We also completed the studies on the effect of the longitudinal net-section compressive force on the compressive strain capacity (CSC) of a pipe. The results showed that the CSC under pure longitudinal compression is much lower than the CSC under bending. The longitudinal compressive force has limited effect on the CSC under combined bending and compressive force when the compressive force is relatively small.

Some other key findings include: (1) a consistent definition of the compressive strain capacity for the pipes with different anomalies is needed and (2) the strength mismatch between the thicker and thinner pipes connected by the transition welds was one of the most critical parameters for transition welds.

Monthly reports were submitted online. Two online progress review meetings were held on 10/29/2014 and 12/3/2014, respectively.



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2 Work Planned for the next Quarter

The work planned in the next quarter includes: (1) pipe procurement and weld fabrication, (2) small-scale material tests, (3) finite element analyses and model development, (4) curved-wide plate tests, (5) full-scale pipe tests (i.e., tolerance to hoop strain under high longitudinal strain and tensile capacity of pipes with corrosion defects), and (6) project management, monthly and quarterly reports, and meetings.

