

## QUARTERLY REPORT – PUBLIC PAGE

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

*Project Title:* Second Generation Models for Strain-Based Design

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## Progress to Date

This project, funded by PHMSA, PRCI, and several other industry partners, is part of a consolidated program aimed at developing strain capacity models and documented procedures for establishing tensile strain capacity limits. Industry partners directly participating in the study include BP, Chevron, Duke, El Paso, Enbridge, ExxonMobil, Gassco, Gaz de France, IPSCO, JFE Steel Corporation, Lincoln Electric, Nippon Steel, Pacific Gas & Electric, Petrobras, Saudi Aramco, SoCalGas, TransCanada PipeLines Limited, TAMSA and Williams.

The primary objective of this work is the development of second generation models that provide more comprehensive guidance, particularly quantitative and user-friendly guidance, on the effects of internal pressure on tensile strain capacity. This objective will be met through the critical evaluation of high-quality test data generated in Project 200 “Validation and Documentation of Tensile Strain Limit Design Models for Pipelines.” Data are expected to provide indications of the significance of internal pressure effects on tensile strain capacity and potentially indicate a need for development of separate failure-mode models to address both *ductile failure* and *brittle failure*. Existing strain-based design models have focused primarily on ductile failure. The potential for transition temperature shift due to bi-axial loading also needs to be considered. It should be noted that there are currently no reliable models to predict transition temperature shift due to bi-axial loading effects.

The project is comprised of the following tasks:

1. Post Test Examination of Failure Mechanisms
2. Development of Second Generation Models
3. Second Generation Model and Design Procedure Update
4. Program Management

Delays in the initiation of testing on Project 200 have resulted in a delay in the start of this project. It is expected that work will be initiated subsequent to the start of testing activities in Project 200, in Quarter 7 of the consolidated program.