



**DRAFT QUARTERLY REPORT**

DOT Project No.:

Contract Number: 693JK31810001

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# Improvements to Pipeline Assessment Methods and Models to Reduce Variance

**Reporting Period:**

November 1 2018 through January 31 2019

**Report Issued:**

January 31<sup>st</sup> 2019

**Prepared for:**

U.S. Department of Transportation Pipeline and Hazardous  
Materials Safety Administration

Charles Onwuachi

713-272-2858

[charles.onwuachi@dot.gov](mailto:charles.onwuachi@dot.gov)

**GTI Project Manager & Technical Contact:**

Ernest Lever

Principal Investigator

Gas Technology Institute

[elever@gti.energy](mailto:elever@gti.energy)

847-544-3415

**GTI Team Members:**

Oren Lever, Daniel Ersoy, Khalid Farrag, Varun Desai

**Subcontractors:**

Arizona State University

Michigan State University

**Gas Technology Institute**

1700 S. Mount Prospect Rd.

Des Plaines, Illinois 60018

[www.gastechnology.org](http://www.gastechnology.org)

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## Executive Summary

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During the second quarter (November 2018-January 2019) work continued to schedule on the following task deliverables due January 31<sup>st</sup>:

- GTI
  - Structural FEM Study, Shakedown Server Environment
  - Structural FEM Study, Shakedown FEM Models and DoE Batch Process
  - Structural FEM Study FEM, Computational Environment Report
  - Project Management, 2<sup>nd</sup> Quarterly Report
- ASU
  - Uncertainty Reduction, Uncertainty Quantification of Material Properties and Defects Phase 2 Report
- MSU
  - FEM Simulation of NDE Signal Responses, Multi-Modal NDE Sensing Techniques, Phase 2 Report

All deliverables were met and are reported on in detail in the body of the report.

In addition to the above GTI continued working on the Full-Scale Pipe Testing Report that is due in the sixth quarter. The first full scale test will be conducted late February 2019 in conjunction with the commissioning of the Aramis 3-D metrology system that will be used for data acquisition. A full 3-D FEM simulation of the pipe test will also be completed to allow us to perform the first validation of the FEM computational model. The outcome of this evaluation will be promptly shared with the TAP outside of the quarterly reporting process.

Additionally, we communicated with the project team working on DOT Contract 693JK31810003, “*Validating Non-Destructive Tools for Surface to Bulk Correlations of Yield Strength, Toughness, and Chemistry*”. The purpose of the coordination was to ensure that in this project we can perform full-scale pipe tests on pipes received from operators (for the project mentioned) that have detailed material properties fully documented by the project work. This data will become available in the fourth quarter of this project. We will select pipes that cover the widest range of material toughness covered by the samples received. This approach will ensure that we can calibrate the FEM models to a wide range of material toughness and material chemistry.

A group call with the TAP will be scheduled in the third quarter to discuss:

- The set of interacting threats that should be modelled in FEM
- The full-scale pipe tests that should be carried out

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Work was done on the database tasks still outstanding from the first quarter. We have realized that we must do a lot more up-front work than initially anticipated on defining the knowledge management approach and tools we would like to have available at the end of this project. This definitional work impacts the structure of the database. Several existing ontologies that address material properties and infrastructure components have been identified and we are working on synthesizing an ontological approach appropriate for this project and the specified deliverables of the project. This work will extend at least into the third quarter but does not impact the project schedule. All data is currently being stored in a well-designed, protected and backed up server environment and no task is impacted by the lack of an integrated multi-model database. This integrated database is relevant to the dissemination of the project results after completion.

The project is on track with 93% of the expected deliverables met and no major issues identified at this stage. The 7% not invoiced on schedule is related to the knowledge management item discussed above and does not impact the project progress.

The GTI FEM modeling is performing to expectations and the university work is progressing as planned. There is healthy communication across the team. We expect a very productive third quarter.

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