# Quarterly Report – Public Page

| | |
|---|---|
| Date of Report: | June 30, 2016 |
| Contract Number: | DTPH56-15-T-00019 |
| Prepared for: | DOT/PHMSA |
| Project Title: | Intrinsically Locatable Technology for Plastic Piping Systems |
| Prepared by: | Operations Technology Development |
| Contact Information: | Maureen Droessler (Team Project Manager)<br>Maureen.droessler@gastechnology.org<br>847-768-0608 |

For quarterly period ending: June 30, 2016

**Project Scope**

The scope of the project will be to develop an electronic marking system that will provide locatability to the target depths on various diameter high density polyethylene (HDPE) and medium density polyethylene (MDPE) for gas applications. The project will also assess the technology capabilities versus pipe diameter, burial depth, and pipe burial methods (horizontal directional drilling, open trench, etc.). Included in the marker development will be the development of a flexible housing to allow the solution to be adaptable to a wide range of pipe diameter sizes. The attachment method will be integrated into the plastic pipe manufacturer process and workflow. Laboratory and field evaluations will be performed to validate the system to be commercially viable as an intrinsically locatable PE piping system.

**Technical Status**

During the third quarter, all the assessments have been completed as planned (deliverable #5 (Task #2) and deliverable #6 (Task #3) and results indicated basic capability of the design to meet the target ruggedness and longevity specifications, using modeling, simulations and breadboard testing.

The objective of Task-2 “Marker Technology Development” is to develop electronic path markers specific to the needs of the team input received during Task 1. The project team solicited utility end users for specifications required for locate accuracy, performance, durability, and other performance parameters.

The marker resonator and housing design failure modes have been identified, assessed and grouped as “hard” and “soft” failure modes. The marker resonator design shows basic high stability and reliability capability for long term operation for on-pipe underground application.

The objective of Task-3 “Marker Housing Development” is to develop concepts for a flexible housing for the electronic path markers which can be attached to pipes and meet the pipe’s bend radius, type, size

and installation method. The team made their final mechanical design philosophies and requirements for an electronic marking device that can be attached to a plastic pipe for buried applications. Computer simulations have been used to analyze multiple designs resulting in the design specified in the report that will be advanced to physical testing.

All the target specifications have been validated through simulation which completes the mechanical housing development task.

The objective of Task-4 “Attachment Method Development” is to examine and evaluate various attachment methods of the marker housing to the PE pipe. The team developed design studies to predict carrier integrity over a range of loading conditions through the use of Finite Element Analysis (FEA).

**Results and Conclusions:**

The project is progressing well with good assessment results for the markers and housings developed. In addition, various concepts for the flexible housing to meet the pipe’s bend radius, type, size and installation methods were developed. The anticipated stresses from handling and installing plastic pipes have been simulated on two basic configurations and housing designs without revealing any issues of concern. The marker resonator and housing design failure modes have been identified, assessed and grouped as “hard” and “soft” failure modes. The marker resonator design shows basic high stability and reliability capability for long-term operation for on-pipe underground applications.

**Plans for Future Activity:**

The next steps will consist of fabricating a large number of samples for bench parametric testing and field test qualification.

During the next quarter, the following activities will be conducted:

- Finalize Task 3 by fabricating prototypes of the marker housing with magneto-mechanical resonators for pipe attachment and field testing.
- Continue Task 4 efforts by evaluating pipe attach process options.