

## **2022 COLUMBIA GAS OTD PROJECTS**

### **Gas Operations R&D Projects**

#### **Cybersecurity Collaborative - Phase 2**

Continue the successful efforts of the Collaborative between OTD and the Department of Homeland Security (DHS) which is a 50% co-funder. The collaborative addresses high priority cybersecurity issues using a multi-year coordinated process focused on the development of an outreach and education process and a technology evaluation and transfer initiative.

#### **Material-Supplier Quality Assurance Program**

Assist gas utilities in creating best practice guidelines to develop and manage a material-supplier quality assurance program, create a standardized approach to key processes affecting the quality of materials used by the gas utilities, and identify and select comprehensive regulatory and technical requirements specific to products utilized in natural gas transmission and distribution systems.

#### **Spray-On Leak Seal for Meter Set Joints**

Identify possible spray-on or brush-on solutions to seal thread leaks on meter set assemblies (MSAs) and conduct a thorough evaluation of the various identified systems. The evaluation effort is to establish ease of use and permanency of the identified sealants.

#### **Single Path Meter Testing (Sensus and Itron)**

Conduct the necessary evaluations of recently introduced Sensus and Itron (and potentially others) "Single Path" Ultrasonic residential meters for utility and State Commission acceptance. This effort will prove the measurement performance and accessory meter technology to allow the use of this style of meters by LDCs.

#### **Single Path Ultrasonic Meter Long-Term Performance Testing and Monitoring**

The objective of this project is to install single-path ultrasonic residential meters on live gas distribution systems and conduct long-term performance and accuracy testing over an 18-month period. These installations can take place at GTI or on a project sponsor's delivery system.

#### **Smart Shut off Technology for Commercial and Residential Buildings**

Currently, the natural gas industry infrastructure lacks enhanced smart safety features that can detect and terminate gas flow in response to a hazardous incident such as a gas leak inside a residential or commercial structure. There are commercially available stand-alone devices such as excess flow valves and natural gas leak detectors, however these devices do not possess the communication ability to automate a safety response among emergency personnel, natural gas customers, gas shutoff, and the local gas distribution company (LDC). A Natural Gas Smart Safety Shutoff System would provide an additional layer of protection for customer's life and property by detecting hazardous conditions, providing appropriate alerts and having features that can automatically take preventative actions such as stopping the flow of gas into a structure.

This cofunded project with the California Energy Commission (CEC) will provide the natural gas industry with the necessary hardware and software components that comprise a full solution smart safety shut-off system for use in residential and commercial structures.

### **Product and Process Validation Program Phase 2**

Create a program to validate product performances through testing to confirm that the manufacturers still produce high-quality material meeting industry requirements. The program will compare the performances of similar products from various suppliers to help make informed decisions about their usage.

### **Meter Removal Tool - Commercialization Phase**

To commercialize the meter removal tool designed and tested as part of SMP project Compact Meter Removal Tool. This meter removal tool was designed to loosen seized meter swivel collars ranging in size from #1 & #2 Sprague, 10 LT, 20 LT, 30 LT, and 45 LT. This project will identify and collaborate with an industry tool manufacturer and distributor to enhance the design of the meter removal tool prototype and ultimately bring it to market for the industry.

### **Development of a MDPE and HDPE Allowable Pull Load Calculator**

To create a means for the project designer or field employee to calculate the allowable pull load and select the correct weak link for performing Horizontal Directional Drilling (HDD) pipeline installations as required by federal regulations.

### **Gap Identification Between Hydrogen and Natural Gas Pipeline Standards and Practices**

A gap analysis whitepaper report will be delivered to study safety, industry standards (ASME, ISO, EN, e.g.), and impacts of hydrogen blended gas to 49 CFR Parts 190, 191 and 192. The whitepaper report will list the gaps identified including potential solutions, whether any research was performed in those areas and where further research is required. Recommendations and action items related to the gaps discovered maybe utilized for future projects and/or phases that will further the development of the safety and efficiency of the delivery of hydrogen blended natural gas.

### **Effect of Hydrogen Blended Natural Gas on the Performance of Gas Meters and Diaphragm Type Service Regulators - Phase 1**

To examine the effect of hydrogen blended natural gas on the performance of domestic gas meters in terms of measurement accuracy, intrinsic safety through extensive, long duration testing. To examine the effect of hydrogen blended natural gas on the normative performance of diaphragm type service regulators, specifically addressing materials compatibility, and gas leak concerns. In addition, other meter set assembly (MSA) components can be considered for evaluation in the long duration testing.

### **Evaluation of Micro-Thermal Gas Metering Technology**

The objective of this project is to evaluate the accuracy and overall performance of micro-thermal gas metering modules while measuring hydrogen-blended natural gas and biomethane gas volumes.

### **Using Alternative-Steel and Composite Material in Gas Pipeline System**

The project provides a framework and requirements for the installation, inspection, and integrity management of alternative-steel and composite systems in natural pipelines. The study addresses: 1) material testing, 2) construction requirements, 3) damage and assessment of defects, 4) degradation of the pipe material, and 5) inspection and maintenance activities to ensure the integrity of these systems for safe and reliable implementation.

### **Pressure Monitoring and Alert Device for the Replacement of Token Reliefs**

To identify and/or develop a low cost pressure monitoring device that can be installed in place of relief valves (token or full-relief) or monitor regulator. In addition, explore other benefits of pressure monitoring in real time.

### **Gas Engineer Training Program Development**

Start development of a structured gas engineer training program, for new engineers entering the industry, on an advanced LMS system. This training program will consist of blended learning lessons that will include eLearning, micro learnings, interactive videos, gamification, quizzes and assessments, learner paths, social communities to discuss training topics, etc. Use of these modern learning methods will better meet the needs of new engineers entering the workforce.

The first proposed courses are 1) Introduction to Natural Gas and Engineering, 2) Safety Leadership, 3) Gas System & Strategic Planning, 4) Gas Asset Management & Engineering Transmission 5) Gas Pressure Regulation 6) Gas Asset Management & Engineering Distribution 7) Construction & Maintenance

### **Design and Placement of Compact Service Regulators**

This project will review existing practices and perform comparative service regulator testing that will result in recommendations and guidance to the natural gas industry on “vent limiting” service regulators and will provide more options for a gas utility to install or move the service regulator and/or meter set to the outside of the structure.

### **NPT-F Threaded and Other Alternative Joint Connections for Meter Sets**

To evaluate the performances of threads (e.g., ANPT, NPTF) as an alternative to general-purpose NPT threaded connections to reduce small nuisance leaks in meter set assemblies (MSAs). Different thread types (e.g., NPT, NPTF, and ANPT) will be evaluated for their performance and ability to retain a leak-tight seal in differing environmental conditions.

### **Update to ASTM F2897**

The objective of the overall program is to review/affirm the underlying mathematical model and requirements within ASTM F2897 and to make targeted enhancements to enhance its completeness and efficacy. In addition, develop an implementation guide within the ASTM standard as an aid to proper application and use of the system.

### **(GTI) Carbon Management Information Center**

The Carbon Management Information Center (CMIC) is an ongoing GTI collaborative program that is currently funded by 16 natural gas industry members as well as the Propane Education and Research Council (PERC). CMIC is developing resources and analytical tools that clearly and fairly evaluate opportunities for efficient natural gas and propane systems to improve total energy efficiency, to reduce greenhouse gas emissions, and to lower energy costs for consumers compared to electric and oil options.

### **PRCI Membership**

Provide labor and travel support in 2018 for the PRCI membership by OTD. This work is associated with keeping the OTD funders of the project informed about the projects they are funding. OTD will be represented at the PRCI Technical Committees and Board-level Executive Assembly meetings. There are many PRCI projects that complement OTD projects and this project will enable coordination and participation.

### **Quality Audit Program**

To provide natural gas utility operators with a mechanism to collaboratively audit suppliers' quality management systems. The program will conduct an independent and unbiased assessment on behalf of participating operators to provide a reliable and standardized approach for monitoring suppliers. Participating operators will benefit from a collaborative program by creating efficiencies and promoting information sharing.

### **Drone Based Methane Detection – Phase 2**

Unmanned aerial vehicles (UAV, drones) have been proven capable of performing leak surveys and leak investigations. The objective of phase 2 is to establish specific practices or standard operating procedures (SOPs) to use UAVs in leak surveys and leak investigations. This Phase 2 project will focus on developing these practices and information for disaster response (hurricanes, floods, tornados, mud slides, etc.)

### **Company Specific Emission Factors for Commercial/Industrial Meters**

Develop refined company-specific commercial and industrial natural gas customer meter emission factors to address recent changes in the U.S. EPA Greenhouse Gas Inventory (GHGI).

### **Develop Remote Sensing and Leak Detection Platform with Multiple Sensors**

The objective is to improve and deploy additional instances of a defensive pipeline right-of-way (ROW) Monitoring System based on stationary sensors mounted on and near the pipeline. Sensor data from multiple locations along the pipe is wirelessly forwarded to a central location for processing. Analytics at the central location correlates data from multiple sensors to rapidly alert operators to events occurring in the ROW. One prototype system is currently deployed; the project seeks to deploy two more instances with improved field hardware and Machine Learning (ML) analytics incorporated.

This work is a collaborative effort that is co-funded by PHMSA and Operations Technology Development (OTD).

### **Validation of Remote Sensing Leak Detection Technologies under Realistic Conditions**

The project will focus on advancing unmanned aerial (vehicle) systems (UAS, UAV, drone) mounted remote sensing technologies. These will be used to move integrity threat and leak detection methods (currently tested under highly controlled test facility conditions) toward more realistic validation under real-world, operational conditions found within natural gas transmission and distribution pipeline systems. The project will focus on key validation testing components that should occur after completing extensive leak facility testing to ensure equivalency of any new techniques with existing techniques.

### **Gas Dispersion Modeling for Venting Natural Gas from Structures**

The objective of this project is to work with Fire & Risk Alliance LLC (FRA) to develop a best practice on how to properly vent accumulated natural gas from a building through both physical testing using a built structure and computational fluid dynamic (CFD) modeling. The purpose of this research is to map the dispersion and ensuing ventilation of natural gas from within a residential structure for several different scenarios. Industry needs this information so that first responders or utility personnel can employ safe and proven techniques to carefully ventilate natural gas down to levels below the lower explosive limit.

### **Advancement and Testing of a New Handheld Laser Methane Detector**

This project will advance and evaluate, via laboratory and real-world field testing, a novel Quantitative Gas Imager (QGI) being developed by Physical Sciences Inc. (PSI) in collaboration with Heath Consultants Inc.

### **Emissions Quantification and Reduction Strategies Report**

To develop an extensive report laying out the key details involved with quantification of methane emissions and a comprehensive list of methods and technologies being used by local distribution companies (LDCs) to reduce methane emissions.

### **Veritas Gas Measurement and Verification Initiative**

Veritas, a GTI Energy Differentiated Gas Measurement and Verification Initiative, is designed to accelerate actions that reduce methane leakage from natural gas systems. The effort brings together scientists, academics, environmental organizations, certification organizations, and industry participants to demonstrate emissions reductions in a consistent, credible, and transparent way. The initiative will develop accurate and verified methane emissions intensities and the necessary protocols to calculate measurement-informed methane emissions for natural gas systems, by segment.

### **Evaluation of Current Advanced Mobile Leak Detection Systems**

The primary objective of this project will be to evaluate the leak detection performance of advanced mobile leak detection systems. The work will be focused on conducting a single/double blind study of current commercially available systems. A smaller secondary focus will be on a preliminary evaluation of the leak rate quantification abilities of the systems.

### **Optical Gas Imaging (OGI) and handheld laser methane detectors for large leak identification**

The primary objective of this project will be to evaluate the leak detection performance of advanced mobile leak detection systems. The work will be focused on conducting a single/double blind study of current commercially available systems. A smaller secondary focus will be on a preliminary evaluation of the leak rate quantification abilities of the systems.

### **Tracking and Traceability Marking Standard for Natural Gas Transmission Components**

Enable the capture of key information required for physically documenting and geospatially modeling new or repaired gas transmission systems to support the latest PHMSA regulatory requirements. In order to achieve this, three major developments must take place: 1) Develop a machine-readable marking standard for all steel natural gas transmission system components. The marking standard would hold key information and allow the linkage of information required to support the latest PHMSA transmission tracking and traceability requirements. 2) Construct an automated field data collection processes linking the required manufacturers' inspection and test documentation, and support automated definition of each field-installed component in the GIS. 3) Gain the required industry acceptance for publication of the standard under one or more standards organizations.

### **Expertise Portal and Forum**

Increase access to GTI expertise and knowledge through the development and implementation of a web-based portal. A searchable repository of GTI created reports, documents and other digital assets will be made available through the portal. Additionally, a community forum tailor-made for OTD member companies and their employees will be included in the expertise portal. Knowledge assets will be related to a set of conceptual tags specific to gas industry language making finding material and related documents easier. These tags will encourage greater discovery of searched material as well as laterally- and hierarchically-related document.

### **Enhanced Locating Technologies for Underground Pipelines with Better Accuracy**

Gas Technology Institute (GTI), along with White River Technologies (WRT), proposes to improve the safety and integrity of underground natural gas pipelines by increasing the accuracy and availability of horizontal and vertical pipeline location information. The solution is based on enhancing and adapting above-ground large standoff 3D electromagnetic (3DEM) detection technology (developed by WRT) and supplementing the technology with an in-pipe mechanism (developed by Reduct) to focus on congested areas and plastic materials. The combined solution will address most of the infield conditions, including varying pipeline material, depth, and surface cover. The improved tools will provide access to the three-dimensional data in near-real-time.

### **High Accuracy Locator Tech Evaluation**

Evaluation of emerging capabilities in handheld gas locating equipment combining high-accuracy global navigation satellite system (GNSS), locators, and software to collect location and other meaningful data attributes from the locators.

### **Improving HCA Classification Methods**

Improve the accuracy of classifying high consequence (HCA) and moderate consequence (MCA) areas through modern data analysis and data sources. The current methodology to define consequence areas is set by the Pipeline & Hazardous Materials Safety Administration (PHMSA).

It utilizes data that can be outdated and does not consider the dynamic population patterns and development patterns near urban areas. The fluctuating variables can potentially change impact areas and expose unnecessary risk to the gas utility and the human population.

### **Implementing "Pipeline Inspection Documents for Material Traceability and Electronic Test Reports Implementing API 5L RP 5MT, Pipeline Inspection Documents for Material Traceability and Electronic Test Reports**

Develop a standard data interchange template for transmitting a completely digital Material Test Report (MTR) in compliance with API 5L Recommended Practice RP-5MT. The template should support modern data interchange technology use to transmit data securely across the internet. The data and processes must support methods of insuring authenticity of the resulting data originating at the manufacturing and supporting traceability back to the components that are associated with the MTR.

### **Standardized Utility and Supplier Comanaged Inspection and Test Record Storage**

The objective of this proposal is to build a communications process to executed against a standardized document store controlled by a utility and comanaged by their suppliers. The process would automatically verify that the needed quality control documentation for a transmission component is available and under the control of the utility and accessible by processes initiated by a single barcode scan.

### **Work Zone Intrusion Detection and Warning System**

The objective of this project is to perform market analysis and testing of Work Zone Intrusion Alarm (WZIA) technology. GTI will provide OTD members with a Cost Benefit Analysis including features and pricing of the evaluated solutions. GTI will also provide recommendations based on the various work zone scenarios that field crews may encounter.

### **Data Collection, Normalization and Integration Methods to Enhance Risk Assessment Tools for Decision Making**

Explore the application of various kinds of statistical and machine learning techniques to identify the quality, reliability, and traceability of sensor data in assessing integrity risks. Develop improved methods for estimating risk levels within a pipeline risk management system. Develop methods to estimate the value of information provided by sensors of various types in different applications. Develop decision tools to support pipeline integrity managers in selecting the most cost-effective additions to sensor networks in terms of reduction in expected risk within a given budget for risk management.