

Results in Use

Since 2003, the OTD program has provided utilities, pipeline companies, service providers, and others in the natural-gas-delivery business with innovative tools, enhanced processes, and advanced equipment for improving gas system operations.

These products represent the results of OTD efforts to build a stronger industry infrastructure, enhance system integrity, and improve the efficiency of a wide range of operations activities.

Selected OTD-Developed Products in the Marketplace

> Jameson Direction Entry Tool and Live Tracer

Jameson, a Spartaco Company

This directional tool enables vertical insertion of tracer rods and cameras into live gas mains, facilitating the difficult first bend at entry. It operates on live mains with no blow by and is compatible with keyhole procedures (fits 24-inch minimum keyhole). The tool can be used on mains as small as two inches in diameter; rotates 360° to insert in either direction; and fits most camera heads. The device works with commercially available saddles, valves, and tap tools, and on PVC, PE, steel, and ductile iron mains.

Contact: Brad Kokoski | 803-222-8454 | www.jamesonllc.com



> Large-Diameter, Medium-Pressure Inflatable Stoppers

Mainline Control Systems

Marketed as the Kleiss MCS Flow Stopping System, this new system is used to stop the flow of gas in polyethylene, steel, cast-iron, and PVC pipes at diameters up to 18 inches and pressures up to 60 psig. The system, which is manufactured in Europe, was investigated through OTD to validate its operation and potential savings in the U.S. gas industry.

Contact: Wade Farr | 812-459-3936 | wfarr@mainlinecs.com | www.mainlinecontrolsystems.com



> Portable Methane Detector (PMD)

SENSIT Technologies

The handheld SENSIT® PMD uses optical-detection technology to provide sensitivity and cost advantages over conventional techniques employing flame ionization detectors. The PMD improves the efficiency of leak surveys, is less costly to maintain than other technologies, and can detect leaks from low ppm to 100% gas.

Contact: Scott Kleppe | 219-465-2700 | jscottk@gasleaksensors.com | info@gasleaksensors.com



> IRED Infrared Portable Ethane Detector

SENSIT Technologies

This easy-to-use handheld detector was developed for use in the field to discriminate natural gas leaks from other sources of methane (e.g., swamp gas, landfill gas, and engine exhaust) and detect trace levels of ethane. The detection of ethane can be used as a fingerprint for natural gas in situations where the origin of a methane leak signal is questioned.

Contact: Scott Kleppe | 219-465-2700 | jScottK@gasleaksensors.com | info@gasleaksensors.com



> Acoustic Pipe Locator (APL)

SENSIT Technologies

SENSIT's ULTRA-TRAC® APL acoustic-based pipe locator provides the ability to locate plastic pipes before excavations and construction. Now commercially available, in tests the system was shown to be capable of detecting multiple buried plastic pipes at depths up to five feet.

Contact: Scott Kleppe | 219-465-2700 | jScottK@gasleaksensors.com | info@gasleaksensors.com



> LocusIQ for Intelligent Inspections

LocusView

A software platform developed through OTD is now part of the LocusView mobile product suite to allow users to collect new installation data directly within a GIS environment. Applications to integrate real-time, sub-foot accurate GPS and barcode scanning are included.

Contact: Alicia Farag | 847-387-9412 | alicia@locusview.com | www.locusview.com

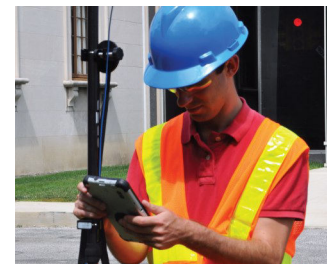


> LocusMap Mobile GIS Solution

LocusView

This system maps new installations with comprehensive tracking and traceability data, creating GIS features in a format that allows field-collected data to be directly integrated into the enterprise GIS. Barcode scanning and high-accuracy GPS automate the system and help create high-accuracy maps.

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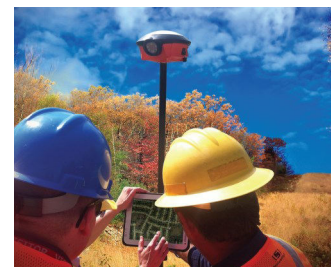


> LocusSurvey for Tracking Leak-Survey Routes

LocusView

LocusSurvey uses tablet computers and GPS to track leak-survey routes. The GPS breadcrumb trail is overlaid in a GIS to track pipe segments that are surveyed to provide real-time reporting and monitoring. LocusSurvey eliminates paper maps and records, automating the process of documenting surveys and leak locations.

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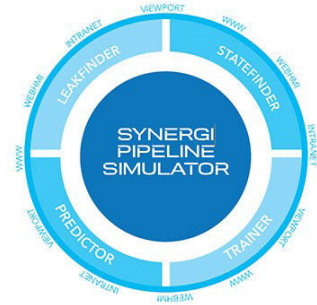


> Synergi Pipeline Simulator

DNV GL

DNV GL's pipeline integrity software, Synergi Pipeline, is a scalable company-wide risk- and integrity-management system. It enables safe and efficient pipeline operations, documents risk, and provides users, including upper management, with a clear overview of the integrity of distribution networks and offshore and onshore pipelines.

Contact: Michael Moore | 717-724-1900 | michael.moore@gl-group.com | www.dnvgl.com



> Lift Assists for Pavement Breakers and Rock Drills

Integrated Tool Solutions, LLC

These devices assist workers in lifting pavement breaker and rock drills after the bits break through surface pavements and rocks and need to be repositioned for the next penetration. By eliminating the need to manually lift and re-position the heavy tools, the lift assists make breaking easier and less physically demanding.

Contact: Ryan Purczynski | 951-929-4808 | rpurczynski@integratedtoolsolutions.com | www.integratedtoolsolutions.com



> Keyhole Pipeline Inspection Camera System

ULC Robotics

The PRX250K keyhole camera is an internal inspection system designed for visual assessment of live mains through conventional pits or small keyholes. The system is easily maneuverable through tight bends, allowing utilities to examine pipe segments without the need to drill additional access holes.

Contact: Greg Penza | 631-667-9200 | gpenza@ulcrobotics.com | www.ulcrobotics.com



> Metallic Joint Locator (MJL)

SENSIT Technologies

The SENSIT Ultra-Trac® MJL accurately locates bell joints, repair clamps, and service connections on metallic piping systems, significantly reducing excavation areas and pavement restoration costs. In field tests, the MJL was also able to detect bell and spigot joints for an eight-inch-diameter water main buried at a depth of six feet.

Contact: Scott Kleppe | 219-465-2700 | jScottK@gasleaksensors.com | info@gasleaksensors.com



Informational Products

Selected OTD-Developed Technical Reports

In addition to the development of new tools, processes, and products, OTD supports research that results in useful information on various aspects related to gas delivery and operations. Listed here are some of the key reports developed under OTD sponsorship.

PIPE & LEAK LOCATION

> RFID Marker Technology Implementation Guidelines

A set of guidelines was developed for the implementation and application of integrated Global Positioning Systems (GPS), Geographic Information Systems (GIS), and “Smart Tag” technologies to streamline public-improvement project planning and prevent damage caused by excavations.



> Cross Bores Best Practices Guide & Videos

Significant research was conducted to investigate gas line/sewer line cross bores. The Guide and “how-to” videos (available through the OTD website) provide recommendations and procedures for preventing and detecting cross bores. (OTD-12/0003)



> Residential Methane Gas Detector Program

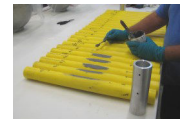
This reports provides results of a project initiated to determine whether commercially available combustible gas detectors are susceptible to giving false positive responses to an assortment of typical household chemicals, including ammonia, ethanol, acetone, toluene, isobutane, ethyl acetate, isopropanol, heptane, and hydrogen. (OTD-13/0003)



PIPE MATERIALS, REPAIR & REHABILITATION

> Repair Wrap for Polyethylene (PE) Systems

Researchers evaluated a new composite pipe wrap system for the repair of mechanically damaged polyethylene gas pipe. The repair system has the potential to lower repair costs, reduce repair times, and minimize service disruptions. (OTD-17/0001)



> Liners/Composites for the Rehabilitation of Distribution and Transmission Lines

A report titled *Transmission Infrastructure Roadmap* was prepared to address the implementation of composite piping materials in the rehabilitation of gas transmission systems. This report includes information on composite pipes, trenchless repairs, and cured-in-place structural liners.



> Evaluation of Structural Liners for the Rehabilitation of Liquid and Natural Gas Piping Systems

This report details the results of testing conducted to evaluate the long-term performance of liners and composites used in trenchless operations for the rehabilitation of aging gas distribution and transmission lines.



> Polyurea Coating Testing and Assessment for Gas-Industry Use

A Final Report is available on research into field-applied polyurea coatings for gas industry use. Through a new initiative, long-term field trials will be conducted to evaluate these additional coatings and determine a cost-effective coating-application method and process.



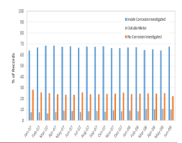
> Electrofusion Coupling Evaluation and Best Practices

Researchers investigated techniques used to perform electrofusion joining of plastic gas pipe in an effort to develop guidelines for the use and operation of electrofusion coupling. With a detailed set of guidelines, the gas industry can enhance the performance and safety of its plastic piping systems.



> Risk-Based Atmospheric Corrosion / Leak Survey Considerations

To address new regulations, researchers reviewed historical and current data on indoor gas service piping. In addition, thousands of recent inspections on outdoor and indoor services were collected and statistically analyzed to determine the trends and drivers behind corrosion rates. A White Paper is available (OTD-15/0004).



EXCAVATION & SITE RESTORATION

> Evaluation of Lightweight Jackhammers

A research team evaluated the performance of currently available lightweight pneumatic and hydraulic jackhammers with respect to their effectiveness in breaking asphalt and concrete pavement, while considering other operational factors such as noise, vibrations, operator impact, and performance.



> Cold-Patch Products Performance Results

This report provides the results of a testing program that evaluated nine commercially available cold-patch products, including two products introduced in the market as “green” patches. Cold- and warm-weather tests were performed and repeated moving loads were applied with a wheel-loading machine that conducted 50,000 wheel passes.



> Evaluation of Flowable Fill Around Buried Pipes

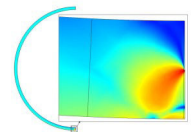
Flowable fill is required by some agencies for use as backfill material for pipe repairs, rehabilitations, and other operations. Presented in this report are the results of performance tests of flowable fill, including the effects of flowable fill on pipeline corrosion and on the detection of gas flow and leaks through the backfill. (OTD-07/0004)



PIPELINE INTEGRITY MANAGEMENT & AUTOMATION

> Correlating Pipeline Operations to Potential Crack Initiation, Growth, and Arrest

To help to reduce risks associated with vintage transmission pipeline materials, researchers developed and validated a model for pipeline operations that correlates pressurization to pipe crack-growth rates, crack initiation, and crack arrest. A Final Report was issued in 2016 that includes a training manual on the use of a Critical Crack Propagation Pressure Calculator that provides a convenient and simple way to calculate the critical pressure at which an axial crack will propagate.



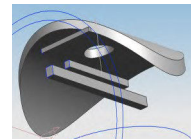
> Hydro-Testing Alternative Program

Researchers developed and deployed a Critical Flaw and Critical Wall Loss Calculator that allows pipeline operators to determine if an inspection technology could detect a crack-like flaw and/or wall loss that would fail a pressure/hydro-test at a particular pressure. A Phase 3 Final Report was issued in 2016.



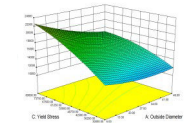
> Establishment of Yield Strength Using Sub-Size Samples Without Gas-Line Shutdown

This report presents the results of a multi-phase project is to develop, validate, and obtain regulatory acceptance for a method to establish pipeline yield strength that allows for a less expensive sampling procedure that does not require the line to be taken out of service. (OTD-13/0005).



> Leak-Rupture Boundary Report and Calculator

This report and associated software allows operators to determine the leak-rupture boundary for a pipe segment based on properties such as the diameter, toughness, and yield strength. Operators can use the calculator for risk modeling and consequence analysis. (OTD-13/0002 and OTD 13/0004)



> Field-Applied Pipeline Coatings: Short- and Long-Term Performance

This report presents the culmination of a 10-year research program to assess more than 80 different commercially available field-applied pipeline-coating products. The goal was to establish an unbiased, third-party basis for operators to select the most appropriate coating system for particular applications.



> Evaluation of Guided Wave Technology as a Hydrotest Equivalent

This report details an evaluation conducted to demonstrate and validate the use of Guided Wave Ultrasonic Testing as an equivalent to a hydrotest. A standard was developed and incorporated by the National Association of Corrosion Engineers (NACE) into the NACE TG410 committee standard. (OTD-11/0001)



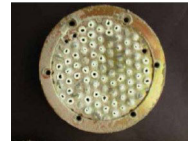
> “Black Powder” Contamination in the Gas Industry: Survey and Best Practice Manual

Black powder – a substance composed mainly of iron sulfides and iron oxides – can cause corrosion and create wear on pipelines. This report provides information on issues, cleanup techniques, and management methods related to “black powder” contaminants. Results were compiled into a “best practices” industry manual. (OTD-07/0002)



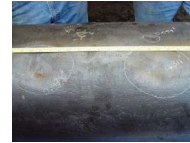
> **Literature Review for Elemental Sulfur Deposits in Natural Gas Transmission Pipelines**

Deposits of “elemental sulfur” – which can block natural gas pipes and equipment – are becoming an increasing concern in the natural gas industry. This report summarizes a literature review to develop a better understanding of the sources, causes, and mitigation possibilities for sulfur deposits found in gas pipelines. (OTD-09/0001)



> **Flaw Acceptance Criteria and Repair Options for Low-Stress Natural Gas Pipelines**

Researchers partnered with pipeline companies and industry organizations to develop modified assessment criteria for low-stress pipelines. The goal was to develop criteria for discriminating flaws that truly affect pipeline integrity from flaws that have no significant impact.



> **In-Field Corrosion Rate Measurement/Determination for Integrity Reassessment Intervals and Risk Prioritization**

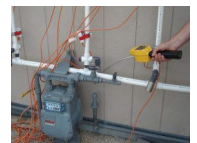
Research was conducted to develop a systematic and simple method to calculate realistic corrosion growth rates for determining pipeline-reassessment intervals.



CONSTRUCTION/INFRASTRUCTURE TECHNIQUES

> **Evaluation of Meter Set Placement and Clearances**

This report presents the results of a testing program to evaluate the distribution of natural gas concentrations around leaks in outdoor meters and regulators. The report summarizes the risk of gas accumulation, gas ignition, and/or gas migration into a building for the various situations tested.(OTD-17/0002)



> **Assessment of Frost Impact on Cast-Iron Pipes**

This study of winter leak-breakage records correlated pipe breakage due to freeze conditions with local site conditions, such as soil properties, weather patterns, and pipe attributes (e.g., depth, diameter, and age). Statistical analysis established relationships between various parameters to enhance winter leak-surveillance procedures. (OTD-15/0001)



> **Evaluation of Static Suppressors on Existing Polyethylene Piping Systems**

Researchers evaluated selected commercially available static suppressors for suitability for use on polyethylene piping systems to eliminate static charge and assess their effects on heat-fusion-joint performance and pipe materials.



> **Evaluation of Commercial/Light-Industrial-Sized Excess Flow Valves (EFVs)**

This reports presents the results of an evaluation of the performance of high-volume EFVs for commercial, multi-residential, and light-industrial applications in response to regulations requiring an expanded use of EFVs.



> **Natural Gas & Indoor Air Quality Website**

A website of vital information on indoor air quality and safety issues was developed for OTD members through the OTD website (otd-co.org). The site provides a center of expertise and a single-point access to scientific data, performance information, and natural-gas-related issues.



> **UV Degradation and Static Buildup Testing of Personal Protection Equipment Fabrics**

Researchers tested various utility-vest materials to determine if degradation is caused by ultraviolet light and to evaluate the potential for static buildup to become hazardous. The results of safety vest testing are available in technical reports.



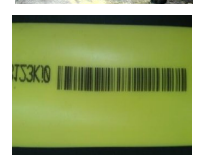
> **Ignition Testing of Electronic Devices**

In this project, handheld electronic devices were tested to determine if ignition occurs in the presence of a flammable methane/air mixture. Laboratory tests demonstrated a large margin of safety under the scenarios investigated. (OTD-12/0001)



> **Intelligent Utility Installation Process**

This report provides a methodology, field process, and a data model for capturing data during new utility installations. The process is used to capture information regarding the location, materials, installation process, environmental considerations, and other factors. (OTD-12/0002)



> **Tracer Wire for HDD Applications**

Extensive research and testing culminated in the release of a report that provides valuable information on the properties and performance of various tracer-wire products for use in horizontal directional drilling (HDD) operations. (OTD-13/0001)



> **Enterprise Decision Support System**

This report presents the results of efforts to create a technology roadmap for the development of an Enterprise Decision Support System to integrate gas-system data and knowledge from various sources into a single information source to support decision making.



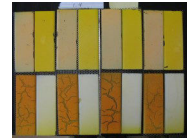
> **Assessment of Vehicle-Barrier Design for Aboveground Facility Protection**

Investigators compiled the latest information on the design, regulations, and installation practices of structural vehicle barriers used to protect aboveground utility facilities from vehicular damages. The Final Report also includes a review of various state and federal safety guidelines.



> **Study of Low-Impact Markings**

A variety of paints, materials, and techniques were tested and characterized in an effort to identify products and methods that can be used for temporary utility marking. Information developed in this study allows users to identify the most appropriate marker type for a given environment to achieve the desired marking duration. (OTD-11/0002)



> **Solar-Powered Remote Monitoring**

In this study, solar-powered devices were investigated as power sources for the remote monitoring of various gas utility facilities to more cost-effectively obtain rectifier data, pipe-to-soil measurement, pipe-to-casing readings, and other information.



> **Integrating GPS into Routine Operations**

This report provides a set of recommendations and GPS implementation strategies developed through pilot programs, literature searches, and reviews of existing applications. Operations that were considered included meter reading, leak surveying, new installations, corrosion monitoring, and valve inspections.



> **DVDs for Training First Responders**

DVD training products help gas companies better educate first-responding personnel about natural gas emergencies. Learning modules with realistic scenarios cover a variety of issues to enhance public and worker safety. The product also serves to improve emergency-response effectiveness and coordination. (OTD-07/0005)



METHANE EMISSIONS/DETECTION & GAS QUALITY

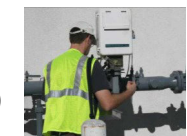
> **Siloxane Concentrations in Biomethane**

Biomethane from various waste products could provide consumers with a significant source of “green” renewable energy. In efforts to help develop this green resource, a study was conducted into siloxane – one of the potential constituents in biomethane – to assess its influence on health, the environment, and gas-fired appliances. (OTD-12/0005)



> **Field Measurement Program to Improve Uncertainties for Key Greenhouse Gas Emission Factors for Distribution Sources**

This report summarizes the results of field surveys conducted at six natural gas utilities. With the support of the American Gas Association, research updated emissions factors for metering stations, regulating stations, and customer meters. (OTD-10/0002)



> **Improving Methane Emission Estimates for Natural Gas Distribution Companies**

This report details Phase 2 of a four-phase field-testing program to evaluate gas leak rates from belowground pipelines, provide a simplified procedure that can be used to monitor pipeline leaks from surface measurements, and update the methane emission estimates for the main lines in a distribution system. (OTD-14/0001)



> **Pipeline-Quality Methane: North American Guidance Document for Introduction of Dairy-Waste-Derived Biomethane into Existing Natural Gas Networks**

The guidance document provides reference and recommendations for the consideration of biomethane from dairy-waste digestion for introduction into gas pipeline networks. The report details results of a biogas/biomethane Gas Technology Institute research program.



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