Mechanical Damage Technical Workshop

> Prevention Technology Research

Maureen Droessler
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Operations Technology Development (OTD)

> OTD is a stand-alone, 501c (6) not-for-profit, member-controlled company where gas utilities work together to develop technology solutions to common operations issues

  - Membership dues are based on the number of customers
  - Each company votes and allocates their own dollars towards specific projects
  - All members have access to all project information
  - Established in 2003

> Currently 17 members

> 2006 Dues are approx. $7.4mm
Research Objectives

> Enhance System Safety
> Improve Operating Efficiencies
> Reduce Operating Costs
> Maintain System Reliability and Integrity
Research Program Areas

> OTD Funds 6 Program Areas

– Pipe and Leak Detection
– Pipe Materials, Repair, and Rehabilitation
– Excavation and Restoration
– Pipeline Integrity Management and Automation
– Operations Infrastructure Support
– Environmental Science and Forensic Chemistry

> 17 new projects starting in 2006
Damage Prevention Technology Challenges

> Monitoring and characterizing unauthorized activity near pipelines
  – Consider both internal and external monitoring

> Developing tougher materials
  – Pipe or coatings that resist damage

> Improving locators
  – Address accuracy, depth, smaller diameters, types of material detected, lower cost, and ease of use
Underground Facility Pinpointing

> Description:
  – Addresses Subsurface Mapping/Location for all piping systems
  – Conduct an independent, comparative, technical evaluation and field evaluation of emerging locator technologies
  – Locator technologies include electromagnetic, ground penetrating radar, magnetic, acoustic, and ultrasonic

> Status:
  – Focus in 2006 is on non-electromagnetic locator technologies including GPR, acoustic, and ultrasonic

> Contractors: GTI and developers

> Time Frame and OTD Funding: 2003-7, $700k, Cofunded with AwwaRF
Hand-Held Acoustic Pipe Locator

> Description:
  - Addresses Subsurface Mapping/Location for all piping systems
  - Uses sonic technology to provide accurate location information on buried metal, plastic, or concrete pipes.
  - Goal is to consistently and accurately detect pipes as small as 2 inches in diameter at depths from 6 inches to 8 feet.

> Status:
  - A prototype detector has been built and evaluated in the field.
  - Work in 2006 includes testing in difficult terrain and improving the speed of the data collection and analysis.
  - Commercialization discussions are underway.

> Contractors: GTI and developer

> Time Frame and OTD Funding: 2004-7, $1.8mm
Buried Pipe Imaging by Capacitive Tomography

> Description:
  - Addresses Subsurface Mapping/Locating for all pipe systems
  - Developing a compact and inexpensive capacitive tomography imaging sensor prototype in the form of a flat plate or flexible mat that can be placed on the ground to quickly and accurately provide an image of the buried objects in the soil below the sensor.
  - Objective is to locate facilities to a depth of 6 feet

> Status:
  - Following successful laboratory testing in 2005, work in 2006 includes electronics simplification, hardening, and field testing. Also, software development and system integration.

> Contractor: GTI

> Time Frame and OTD Funding: 2004-6, $630k
Integration of Electromagnetic and Acoustic Obstacle Detection Systems for Horizontal Directional Drilling Operations

> Description:
   - Addresses Boring Equipment/ HDD Sensing for all piping systems
   - Combines the advantages of two technologies into a single wireless, mobile, obstacle detection concept for use in horizontal directional drilling operations.
   - Objective is to design, build and test a system to provide real-time detection of underground objects near the drill head

> Status:
   - Integration of detection and communication systems with the HDD machine is taking place.
   - Prototype system will be tested in the field in 2006

> Contractors: GTI and developers

> Time Frame and OTD Funding: 2004-6, $880k
Obstacle Detection System for Horizontal Directional Drilling Using Ground Penetrating Radar

> **Description:**
  - Addresses Boring Equipment/HDD Sensing for all pipe systems
  - Adapting and integrating the radar system with the horizontal drilling machine and evaluate the pre-prototype system in the field.
  - Objective is to sense obstacles at least 6 feet in front of the drill head so the system can stop and the operator can maneuver the drill head to miss the obstacles

> **Status:**
  - Electronics are being ruggedized and software integrated
  - Pre-prototype will be tested in the field in 2006

> **Contractors:** GTI and developer

> **Time Frame and OTD Funding:** 2004-6, $650k
Micro-Excavation System

> Description:
  – Addresses “daylighting” the buried pipe for more precise location. Appropriate for all pipe systems.
  – Develop tools to make micro- (4-6 inches) size excavations to access buried facilities through smaller, less expensive openings.

> Status:
  – In 2006, prototype tools are being developed for use in micro-excavations
  – Commercializing partner is being sought for the excavation tool

> Contractors: GTI and developers

> Time Frame and Funding: 2004-7, $815k
Maintenance-Free Pipeline Coatings for Critical Locations

Description:
- Addresses Improved Pipe Materials/Coatings for metal pipe systems
- Evaluating thermal spray systems and coating materials for application on pipe in critical locations and difficult to access areas to ensure a corrosion free life of 50-70 years.
- Objective is to take the relatively mature technology with superior corrosion and mechanical damage protection and apply it to above and below ground pipeline applications

Status:
- Conducting laboratory tests based on ASTM codes and protocols for adhesive and cohesive strength, impact resistance, abrasion, disbondment, effects of salt and UV radiation, substrate corrosion, and blistering.
- Field testing the top four ranked systems in 2006

Contractor: GTI

Time Frame and OTD Funding: 2005-6, $375k
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> Maureen Droessler
maureen.droessler@gastechnology.org
847.768.0608