



*the Energy to Lead*

# Operations Technology Development (OTD) Research

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**PHMSA Workshop  
Improving Pipeline Leak Detection Effectiveness**

**Rockville, Maryland  
March 27, 2012**



# Topics for Discussion

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- > Gas **distribution** leak survey
  - Technologies to detect leaks
  - Technology advances over last two decades
  - Future improvements

Ground-level leaks of a few ppms

Hand-held equipment

Low cost

Easy to operate

# Technologies

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- > Flame Ionization Detector (FID)
  - Walking and mobile survey
    - > Excellent accuracy and very reliable, but
      - Requires hydrogen gas
      - Significant maintenance and calibration costs
      - Responds to all H-C gases
- > Combustible Gas Indicator (CGI)
  - Leak pinpointing/centering
    - > Reliable

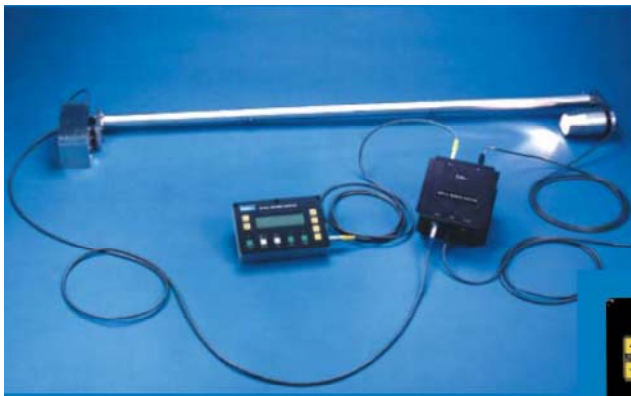
# Optical Methane Detector (OMD™)

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- > Optical system to improve leak survey speed
  - Gas distribution, transmission and gathering pipelines
- > OMD mounted on the front of a survey vehicle
  - Infrared-based technology; No moving parts
  - Specific to methane detection
  - 10,000 measurements per second
  - Sensitivity of 1ppm-m at 25 mph
  - Audible alarm with adjustable set point
- > Productivity improvements of 50% or more over current mobile survey
- > Several hundred units sold and commercially available from Heath Consultants

# Optical Methane Detector\* (OMD™)

Several configurations



\* Developed, designed and tested under GTI/GRI program; Photos from Heath Consultants

# Portable Methane Detector (PMD)

- > Develop Portable Methane Detector based on optical method; Reduce size for walking survey/hand-held unit
- > Sensitive to methane detection only
- > Dual low level (ppm) and high level (% gas) operation in one unit



- > **Industry recommendation: Develop closed path device (sampling device), similar to FID**

# PMD Results

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- > PMDs assembled/tested
- > New wide concentration range patent received
- > Incorporated utility suggestions
- > Tested at four utility sites successfully
- > Technology transferred to Sensit Technologies



# Sensit PMD

> About 200 units sold



851 Transport Drive  
Valparaiso, Indiana 46383



# Ethane-Only Detector: IR Ethane Detector (IRed)

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- > Discriminate Natural Gas Leak from other sources of Methane
- > Portable instrument for field application
- > Detect 250-500 ppb ethane levels in small plumes (reading 20-50 ppm methane)
- > Adapt PMD platform

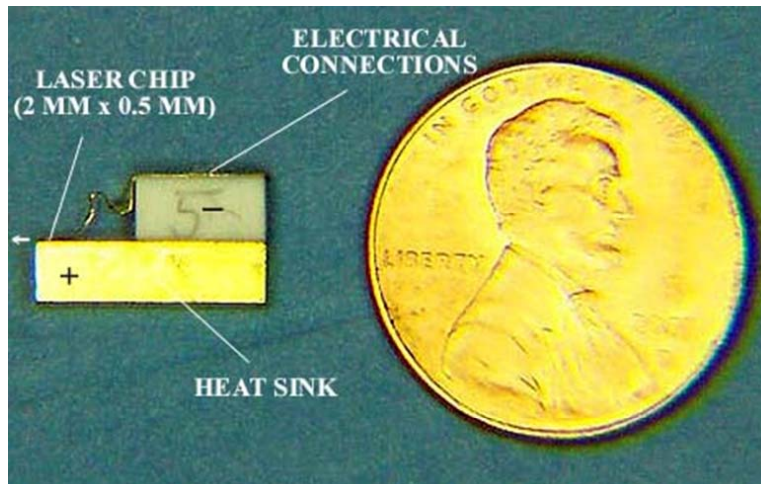
# IRed Results

- > Ethane Sensitivity Target reached
- > Methane interference avoided with zero cell
- > Prototype built and initially tested in lab and at three field sites
- > Licensed technology to Sensit Technologies
- > Plan to initiate Technology Transfer work
- > Commercial device expected in 6-9 months



# Remote Leak Survey Using Lasers

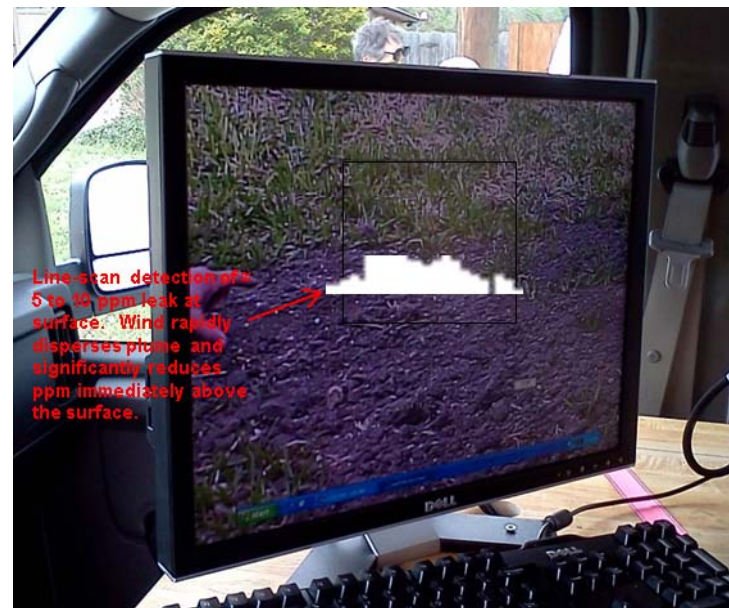
- > Improve leak survey operations for gas distribution mains and services
- > Design, build and evaluate Laser Line-scan Camera (LLC) using semiconductor laser
  - 10 ppm-m sensitivity at a distance of 30 m
  - Vehicle motion up to 15 mph, potentially higher



- Up to 40 mW power at 3.315 microns
- Capable of pulsed operation
- Simple solid-state design
- Inexpensive to manufacture

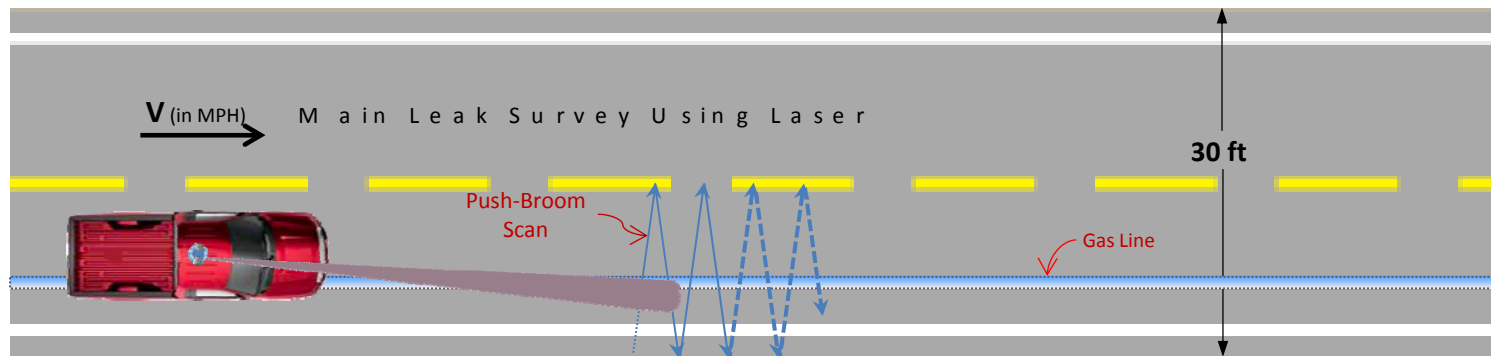
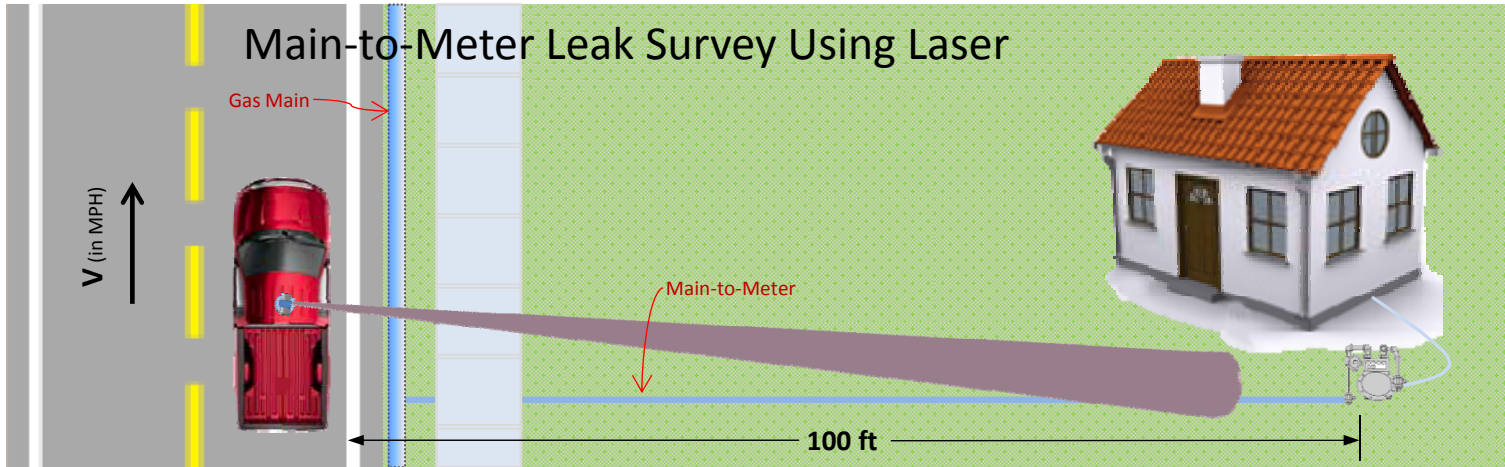
# Initial Results with Pre-prototype

- > Vehicle at Idle
  - Leak displayed as histogram overlaid on background video of survey area



Typical display of small volume leak detected by a laser line-scan camera and overlaid on background video of the survey area

# On-going Development: Build Prototype and Evaluate



# Other Related Projects

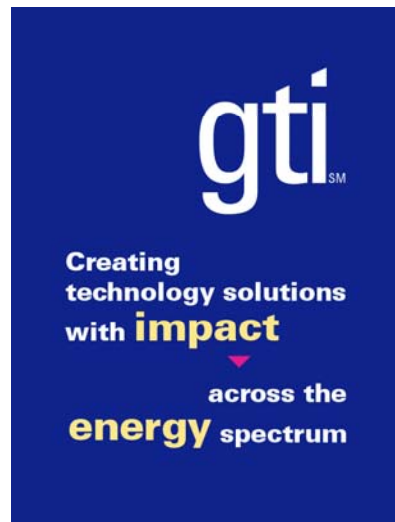
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- > Low cost MEMS methane sensor: Validation testing
- > Automating leak pinpointing: Field evaluation
- > GPS-enabled leak surveying: Utilities are conducting pilots with the VeroTrack software
- > Bluetooth-enabled leak detection equipment: Working with manufacturers to test their equipment and transfer data to GIS

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# Thank you.

## Questions?



*For more information:*

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