Damage Prevention Technology Update

Pipeline R&D Forum

June 24, 2009

Crystal City, VA

NYSEARCH

Topics Covered

- ☐ A-Gas II -Camera surveillance
- ☐ PipeGuard – Geophones sensors
- ☐ PIGPEN- Infrasonic/seismic sensors
- ☐ Handheld Pipe Locator

- ☐ Risk Practices/Models Assessment for DIMP

Potential Benefits of Damage Prevention Technologies

- Real time remote monitoring to prevent third party excavator damages
- Reduce cost & improve safety of operations – 24/7 site monitoring
- Improve overall system integrity & reduce pipeline liability

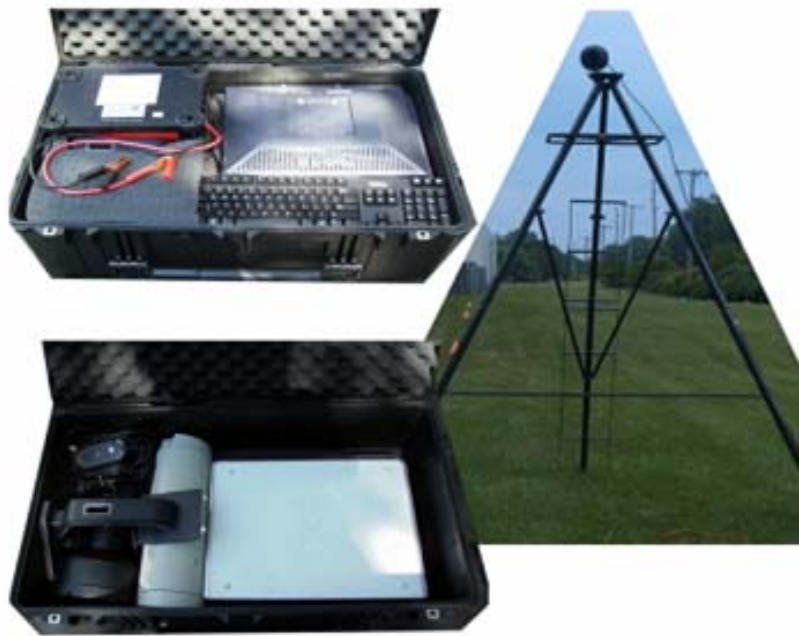# A-Gas II Video Detection System

Contractor: PL-E Communications

- ☐ Objective
  - ■ Evaluate and adapt military defense technology for third party threats to gas pipelines
- ☐ Features
  - ■ Self contained & portable
  - ■ Entire system stays on site
  - ■ Alarm on excavating events only
  - ■ Remote reporting (wireless or hard-wire)
  - ■ AVT234$^{©}$ Target Motion Cueing (TMC™)

A-Gas Technology Overview

A-GAS I

Control box & Tri-pod setup
- Requires Power Supply

A-GAS II
CONCEPT

Weight	5-7 lbs
Size	5"x8"x3"

Urban Test Site – Con Edison
E 16 St East of Ave C

Equipment Tested
- **Backhoe**
- **Mini-Backhoe**
- **Pavement Breaker**

Pole mount

Tri-pod

# Test Results & A-GAS II Status

A-GAS I Results

Overall Total # Events	Positive Alarms	#of Alarms Obscured	Detection Rate
473	450	23	95%

Note: No false alarms recorded for equipment drive-by, parked vehicles, work site setup, people movement and other vehicles.

- **A-GAS I test results were positive**
- **A-GAS II under development**

PipeGuard™

- Description
  - Geophones tuned to detect TP excavators
  - Sense ground vibrations
  - Remote communications
- Features
  - Battery powered - 5 yr life
  - Installed near/along pipe
  - Up to 300m of coverage
  - Requires external antenna
  - Claim: false alarm rate <1%

Ground level   Threat

Sensing Unit   Pipeline
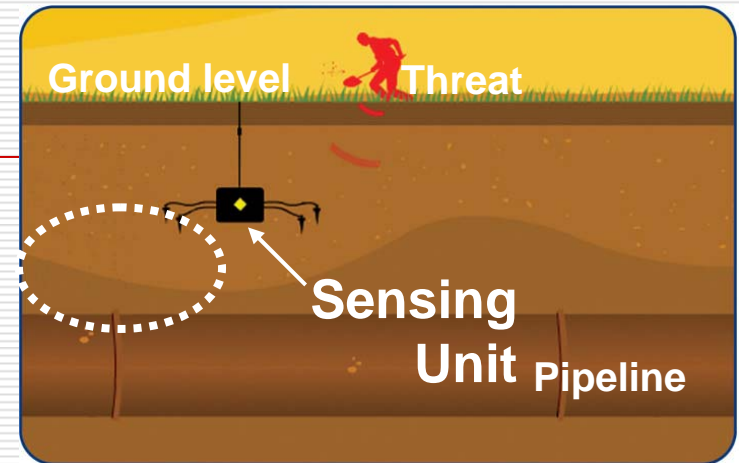
Manufacturer/developer: Senstar (Magal)

First US test site – NatGrid Long Island, NY

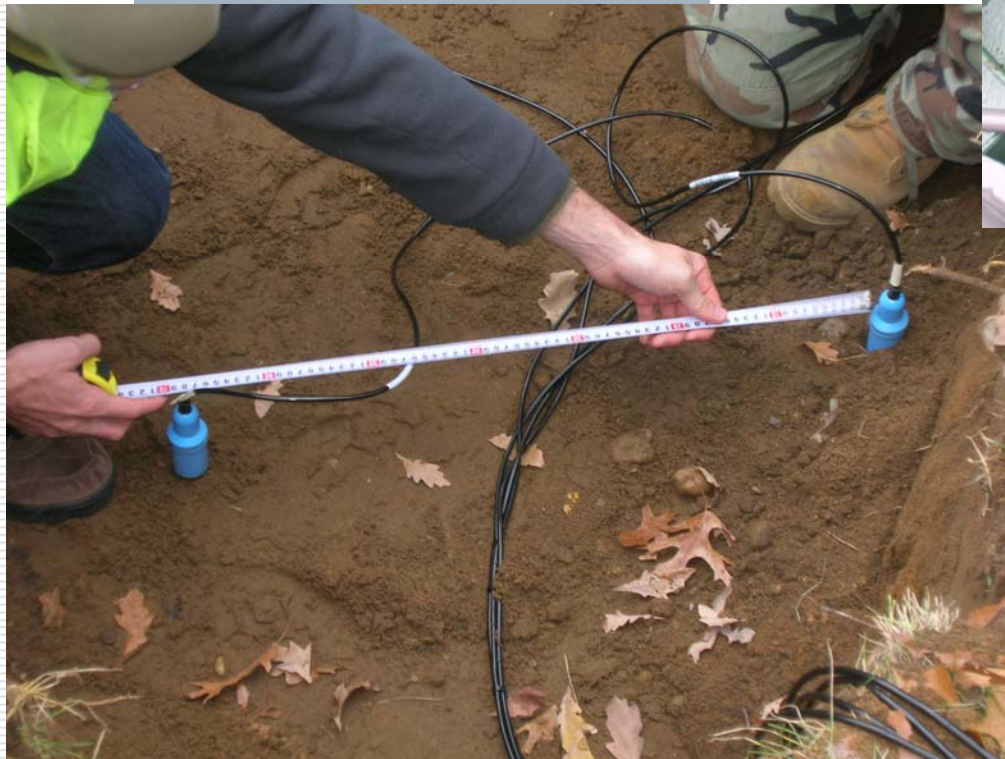User Interface showing alarmed event

!2"– 300 psig Pipeline

PipeGuard™ Installation

Sensor Units installed
460' (140 m) apart

PipeGuard™ Test Results

Pavement Breaker

Backhoe Excavate
Detections up to 200'

Missile – Pneumatic Hammer

Future – Senstar evaluating a small package for local monitoring (< 1000')

PipeGuard™ Summary

- ☐ Able to detect excavating equipment tested up to 200' away
- ☐ Test site: Difficult location with unfavorable soil conditions
- ☐ No false detections recorded
- ☐ Economics may be more suitable if designed for short hot-spot monitoring
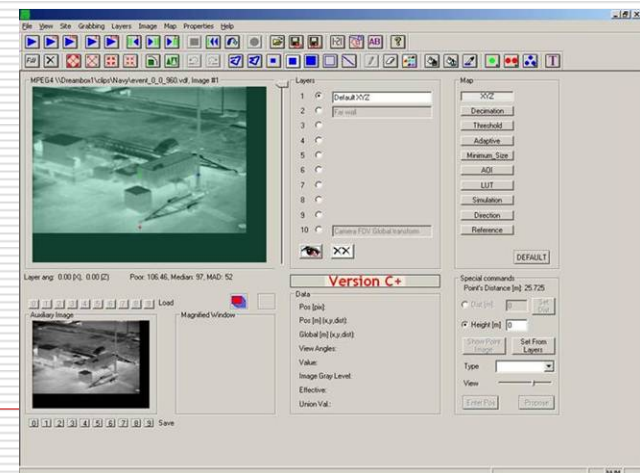- ☐ Low cost cameras can assist by providing visual displays

DreamBox™

- Description
  - Video imaging system & detection analytics for security applications
  - Single camera FOV – 300 ft
  - Wireless communication to remote locations
- Features
  - Track several targets/camera
  - Displays & tracks by color path
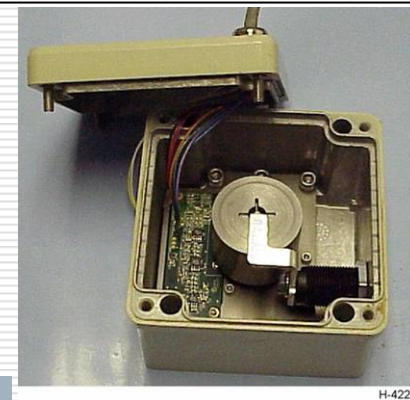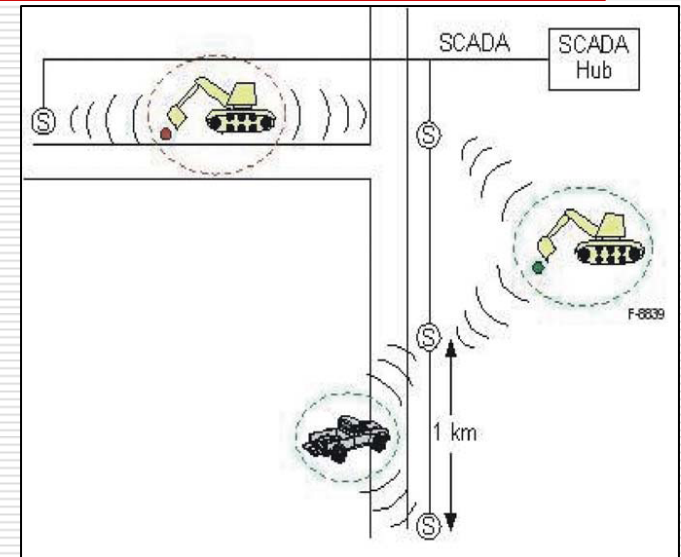
PIGPEN- <u>P</u>roactive <u>I</u>nfrasonic <u>G</u>as Pipeline <u>E</u>valuation <u>N</u>etwork

☐ **Description**

- ■ Detect intrusion/ third party threats using a distributed network of seismic sensors
- ■ Sensors deployed over a wide area – buried in vicinity of pipeline

☐ **Features**

- ■ Sensors placed 100-500m apart
- ■ Identifies threat type and location
- ■ Alarms sent to remote facility
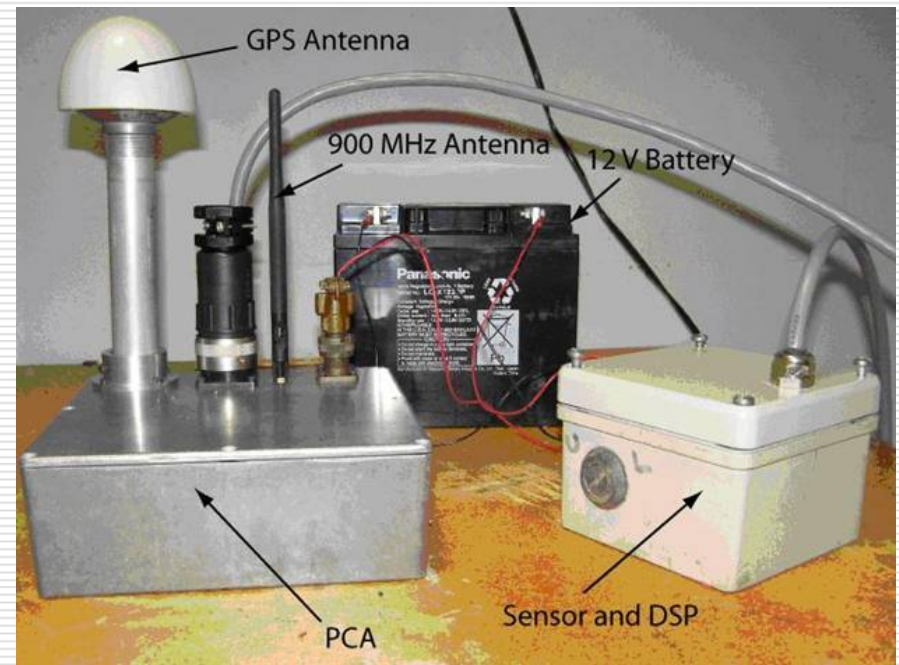

Contractor: Physical Science Inc. (PSI)
Cofunders: DOT/PHMSA, PRCI

PIGPEN – Advantages

- □ <u>Quick deployment</u>
- □ <u>Local pipeline monitoring</u>
- □ Low Sensor Cost ($300)
- □ Low Network Cost
- □ Simple to Install
- □ Does not contact pipeline

GPS Antenna

900 MHz Antenna   12 V Battery

PCA

Sensor and DSP

Handheld Pipe Locator

☐ Objective:

- ■ Develop an inexpensive portable tool for on-site mark-out of facilities using GPR

☐ Features:

- ■ Locate plastic pipe & other pipe materials

- ■ Air-coupled antenna, shoulder mounted battery pack and display

- ■ User interface – onsite processing & cross-section views

Risk Practices/Models Assessment for DIMP

- ☐ Driver:
  - ■ NPRM - Operator must identify and prioritize risk
  - ■ Operators will likely be using risk analyses to support/justify reporting intervals
  - ■ Frequency of evaluation intervals have not yet been determined
- ☐ Project Objective
  - ■ Develop a set of guidelines for engineers & operators
  - ■ Define the necessary elements of a risk model

Deliverables of NYSEARCH DIMP Project

□ Information for Decision-making

- Results of User Interviews/Surveys
- Investigation of related industries/successful practices
- Guidelines for assessing and modifying Risk Methods and Models
- Risk Model Purchasing Spec
- Identification of needs for new risk methods and models

Needs & Challenges
Future Work- Damage Prevention

- ☐ Improvements in contractor notifications thru proactive technology
- ☐ Reduced cost of early warning system(s)
- ☐ Pipe location for all material types
- ☐ Evaluate need for advanced methods for integrating distribution integrity data:
  - Data mining technologies
  - Advanced risk assessment tools