Northeast GAS ASSOCIATION

Damage Prevention & Monitoring Technology Development

PHMSA R & D Workshop

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NYSEARCH

Damage Prevention Technologies

- Advanced Video Surveillance

  (PLE Communications) – camera and IT system technology

- Advanced PipeGuard (Senstar) – acoustic technology

- PIGPEN (PSI & American Innovations) – point sensor with ultra-low frequency technology

- Fiber SenSys Fiber Optic Detection System

Potential Benefits of Damage Prevention Technologies

- Real time remote monitoring
- Improve safety of operations
- 24/7 site monitoring
- Improve overall system integrity & reduce pipeline liability
- Enhance relationship with customer

Advanced Video Surveillance

Contractor: PLE Communications

- Objective
  - Evaluate and develop video detection to reduce third party excavating threats to pipelines
- Features
  - Self-contained
  - Distinguish between benign events and excavating activity
  - Alarm set-up for remote reporting (wireless or hardwire)
  - Detection range up to 250 feet
  - Input Requirements-120 V source

Trailer Setup w/Generator

Advanced Video Surveillance (AVS) Technology Overview

Original Commercial System
Up to 8 cameras

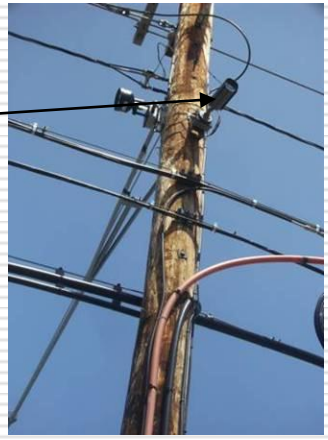
Size difference

AVS system
w/PTZ camera

Deployment Options
- Pole
- Building
- Trailer
- Van

Examples of Test Results RG&E & Con Edison

Camera - Pole Mount



Alarm–red box and audio alert

Backhoe Alarm

Alarms-excavating events

- Backhoe up to 250'– all views
- Pavement Breaker operation
- Shovel operation
- Manual posthole tool

Backhoe at 200'

Breaker at 200'

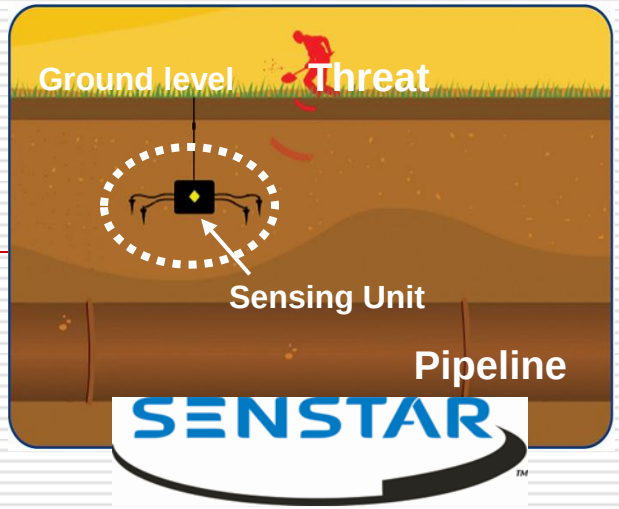
AVS Status

- Final stages of Beta Development
- Improved detection with new color filter algorithm
- National Fuel Test Results
  - Backhoe excavation at 250’
  - Breaker, shovel at 200’
- Beta testing
  - Summer 2012
  - NatFuel, Enbridge & SoCal
- Commercial 2013

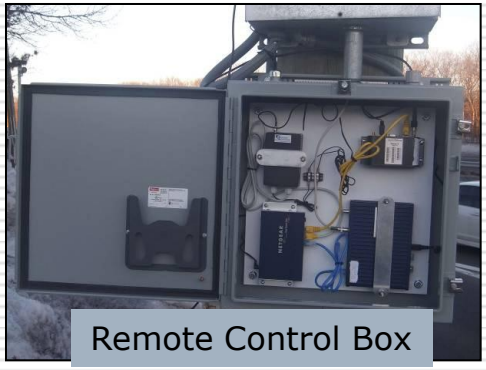
NatFuel tests 2011 & 2012

User interface

Advanced PipeGuard™

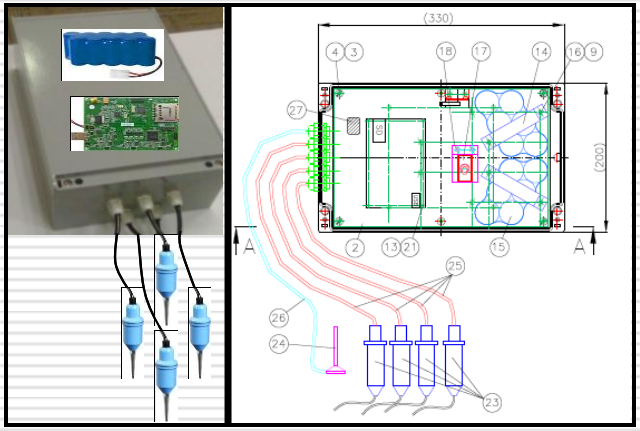


- Description
  - Series of geophones tuned to detect TP excavators
  - Senses ground vibrations
  - Wireless remote communications
- Features
  - Battery powered - 5 yr life
  - Up to 1000 feet of coverage w/ two sensing units
  - Requires external antenna
  - Detect excavating events only
  - A single control box can handle up to 30 sensing units


Remote Control Box

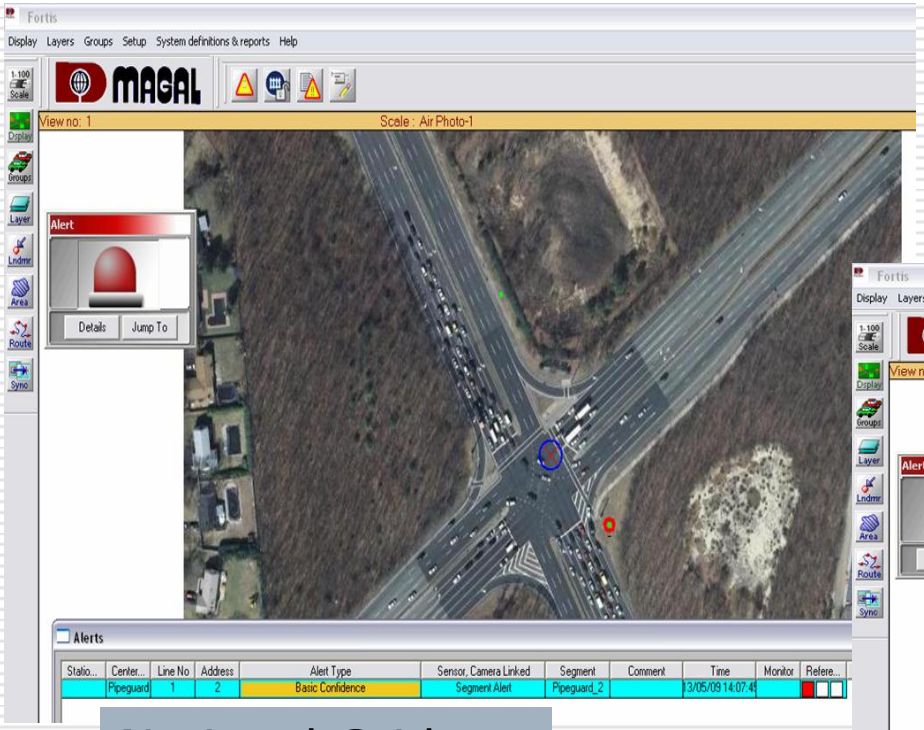

Sensing Unit

Advanced PipeGuard™ –
Control Box w/ Antenna Installation



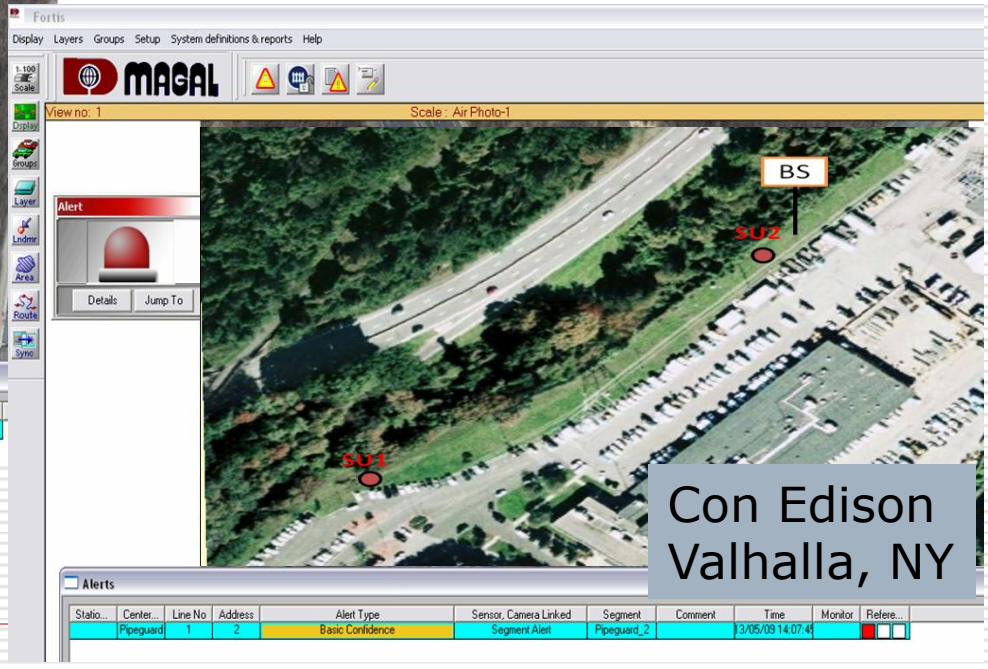
Sensing Unit w/4 geophones

Two test sites installed and in full operation - 2012



National Grid
Stony Brook, NY

Typical user interface
Located at company
Control/Dispatch Centers



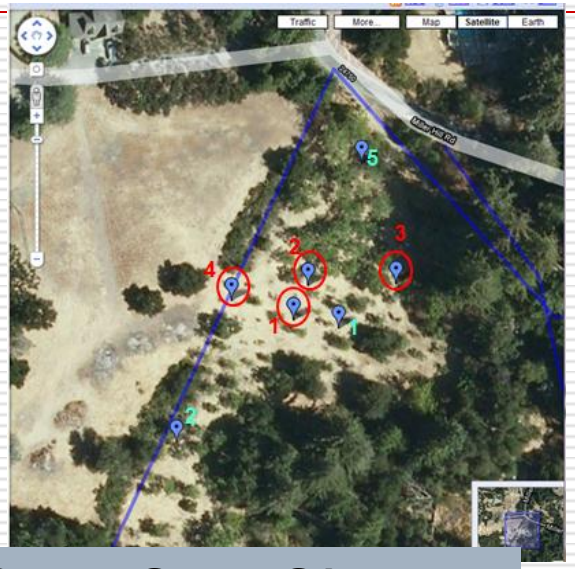
Con Edison
Valhalla, NY

Advanced PipeGuard™ Test Results and Status

- All target detection goals were met
  - Backhoe, pavement breaker & pnuematic missile detections up to 250 feet away
  - Vehicle drive-bys and idle events with no alarms
  - 100% alarms were received with no false detections recorded
  - All alarms received within 3 minutes
- Both sites being monitored by companies and Senstar (via a web interface)
- Reliability and periodic system tests are underway

PIGPEN™ (Proactive Infrasonic Gas Pipeline Evaluation Network)

- Objective
  - Develop a distributed network of infrasound point sensors
  - Able to detect potential intrusion and/or third party damage
- Contractors:
  - Physical Science Inc. (PSI)
- Cofunders: DOT/PHMSA, PRCI



Santa Cruz, CA tests

Advanced PIGPEN

- Individual smart sensors straddle the pipeline at 100-500 m intervals
- Up to 16 sensors communicate wirelessly with the Network Interface Box (NIB)
- Connect with commercial notification system to report alarms & perform health check
- Alarms automatically delivered remotely to end user
- Library of threat signatures

Advanced unit w/battery

Status: Pre-Commercial development & field tests (2012)

Next Generation Fiber Optic System for Detection of Third Party Encroachment on Distribution Pipelines – Fiber SenSys

- **Develop and test a fiber optic (FO) monitoring system for shorter pipelines**
  - Detect third party encroachment within 20m along pipeline length
  - Design for 1-10 mile applications
  - Detect gas leaks
  - Design for a compact field enclosure

Short Ranger™

Next Generation Fiber Optic System for Detection of Third Party Encroachment on Distribution Pipelines – Fiber SenSys

- **Benefits**
  - Lower cost over other FO systems
  - Increased sensitivity over other FO systems
  - Wide range of third party activities and leaks detected
  - Lower power consumption
  - Compact field enclosure requirements

- **Status**
  - System installation at funder ROW complete
  - Threat simulation tests for go/no-go review complete
  - Data analysis in progress

Summary

- NYSEARCH has had a long history of design, development and testing of new products for gas industry and products from other industries for the purpose of proactively warning pipeline operators prior to damage to pipeline

- Technical and economic challenges have resulted in several options that vary in applicability; several different transmission and distribution approaches have been developed, re-worked or optimized and are nearing commercialization

- Current/future R & D Needs include more technology testing and validation