

# PipeGuard™ Phase I Evaluation - Summary

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National Grid  
Hicksville, NY  
Kick-off Meeting  
November 10, 2010



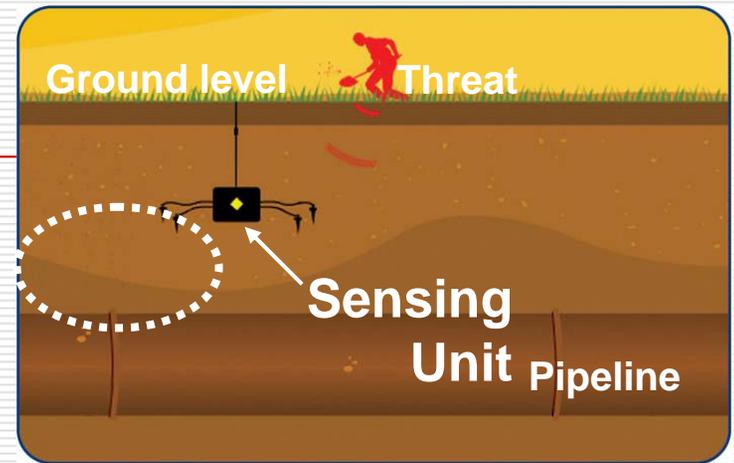
**NYSEARCH**



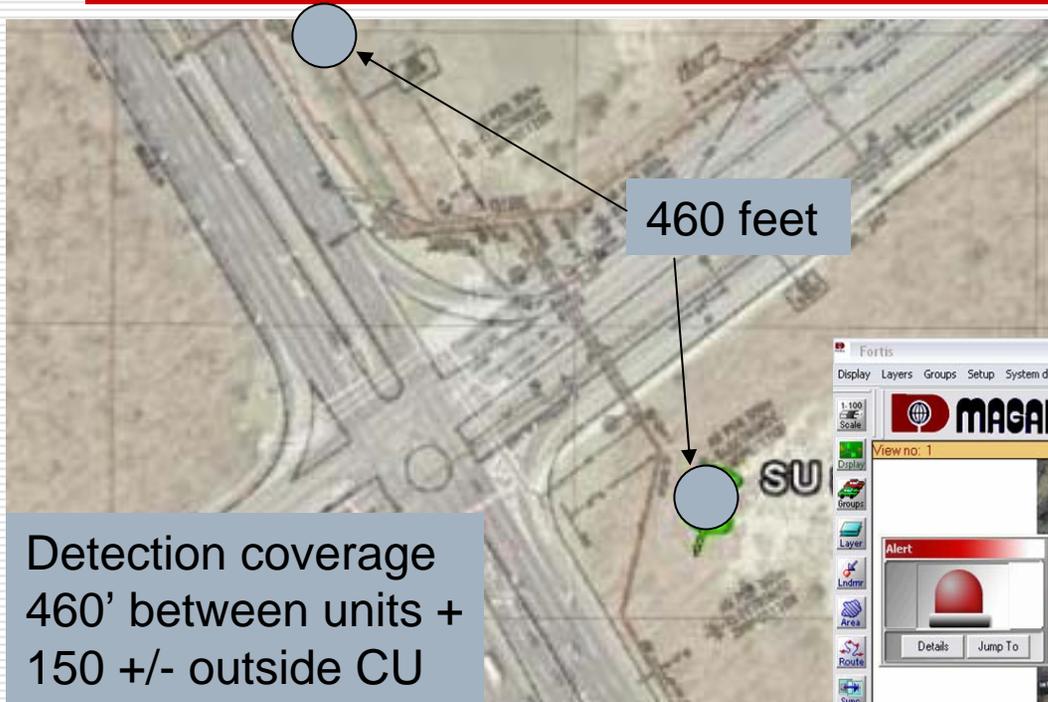
# PipeGuard™

## Existing System

- 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
  - False alarm rate <1% (TBD)



# Phase I Test Site – NatGrid Long Island, NY



Major highway  
intersection

User Interface showing  
alarmed event

Nesconset Hway & Nicolls Rd.

!2" pipeline – 350 psig

Sandy soils

Fortis

Display Layers Groups Setup System definitions & reports Help

1:100 Scale

MAGAL

View no. 1 Scale: Air Photo-1

Alert

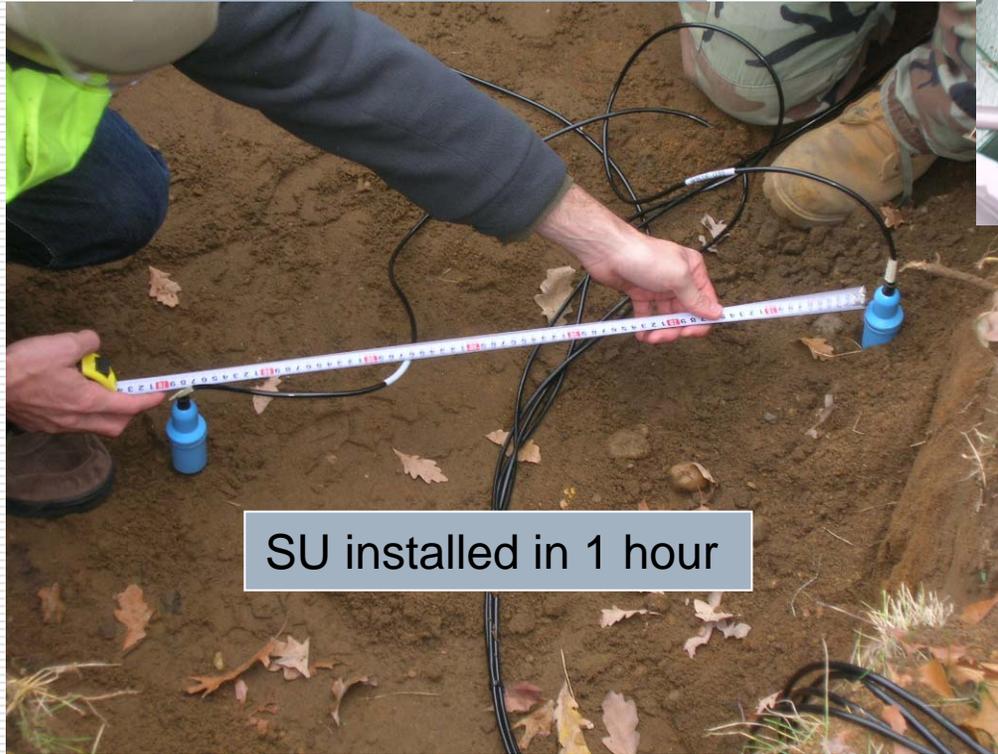
Details Jump To

Statio...	Center...	Line No	Address	Alert Type	Sensor, Camera Linked	Segment	Comment	Time	Monitor	Refere...
	Pipeguard	1	2	Basic Confidence	Segment Alert	Pipeguard_2		3/05/09 14:07:4		

# PipeGuard™ Installation

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**Sensor Units installed  
460' (140 m) apart**



**SU installed in 1 hour**



# Test # 1 –Results December 2008

**No false detections observed!**



**Backhoe Excavate**  
Detections up to 200'



**Pavement Breaker**

**Missile – Pneumatic Hammer**



## Test # 1 –Results

Equipment	Detection Distance (ft)	Detection Time	Comments
Backhoe	75, 100 & 130	1 min to 2.3 min	
Mini-Backhoe	65, 75, 140, 185	2.2 min to 3.25 min	At 185' two tests could hear at 2 <sup>nd</sup> unit - not enough to detect
Small Missile	75	1.3 min	Two tests - missile travel less than 5 feet
Pavement Breaker	80	40 sec	<b>Two tests - grass area &amp; pavement with tamper pad</b>
Shovel	30, 50, 53	2.3 min to 3.3 min	No detection at 100 feet

# Test # 2 –Results November 2009

**Mixed Results – detected 23  
out of 29 excavating events!**



**Backhoe Excavate**  
Detections up to 200'



**Pavement Breaker**

**Missile – Pneumatic Hammer**



# Test # 2 –Results

## PIPEGUARD TEST RESULTS - NATGRID SITE NOVEMBER 2009

Test	Unit	Distance (ft)	Direction	Equipment	Time start	Time finish	Detection Level
1	60	East	Shovel	9:51:00	9:56:50	No detection	
2	1	60	East	Backhoe	9:57:25	10:00:50	No detection
3	1	60	East	BackFill	10:04:25	10:05:45	High confidence
4	1	30	East	Shovel	10:11:25	10:19:50	No detection
<b>5</b>	<b>1</b>	<b>30</b>	<b>East</b>	<b>Backhoe</b>	<b>10:20:37</b>	<b>10:22:30</b>	<b>Low confidence</b>
5a	1	30	East	Back hoe	10:22:44		Medium confidence
6	1	30	East	BackFill	10:25:50	10:28:41	Basic confidence
7	1	60	SW	Pave Breaker	10:35:45	10:36:11	High confidence
8	1	SW	Backhoe		10:38:45	10:40:44	Basic
8a	1	SW	Backhoe		10:50:00	10:56:44	Basic
9	1	60	SW	Missile	11:06:56	11:07:25	Excellent
9	1	150	SW	Paved breaker I		11:19:55	11:19:58 Basic
9a	1					11:20:23	High confidence
10	1	150	SW	Pave Breaker	11:27:40	11:29:45	Excellent
11	1	150	SW	Backhoe	11:53:00	11:59:05	No Detection
12	1	150	Sw	Missile - Soil	12:02:15	12:04:10	Medium confidence
<b>13</b>	<b>1</b>	<b>200</b>	<b>SW</b>	<b>Breaker - Soil</b>	<b>13:39:34</b>	<b>13:41:27</b>	<b>High confidence</b>
<b>14</b>	<b>1</b>	<b>200</b>	<b>SW</b>	<b>Backhoe</b>	<b>13:45:55</b>	<b>13:48:17</b>	<b>Low confidence</b>
15	1	200	SW	Breaker - Asp	13:56:10	13:59:54	Low confidence
<b>16</b>	<b>4</b>	<b>100</b>	<b>N</b>	<b>Breaker - Asp</b>	<b>14:33:16</b>	<b>14:33:50</b>	<b>High confidence</b>
17	4	100	N	Breaker - Soil	14:38:07	14:39:13	Excellent
18	4	100	N	Breaker - Asp	14:43:22	14:44:36	Excellent
19	4	100	N	Back hoe	14:49:39	14:55:26	No Detection
20	4	100	N	Missile - Soil	14:59:15	14:01:42	Medium confidence
<b>21</b>	<b>4</b>	<b>200</b>	<b>N</b>	<b>Breaker - Asp</b>	<b>14:16:25</b>	<b>14:17:38</b>	<b>Excellent</b>
<b>22</b>	<b>4</b>	<b>200</b>	<b>N</b>	<b>Breaker - Soil</b>	<b>15:20:52</b>	<b>15:22:34</b>	<b>High confidence</b>
23	4	260	N	Breaker - Soil	15:26:35	15:27:28	Basic
24	4	65	N	Backhoe	15:38:55	15:44:53	Medium confidence

# Phase I Summary

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- Site installation
  - Control units easy to install
  - System tuning issues
  - Requires dedicated electric power source
  - Video imaging is optional –adds complexity
- Test # 1 – excellent results
  - Detections up to 200' away
- Test # 2–mixed results W/80% alarm rate
- Difficulty with Remote alarm & video
  - Network card/modem issues

# Improvements Needed

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- Detection consistency & reliability
  - Remote communications-including video
  - Target >95% alarm detection rate
- Reduce detection time for alarms
- Reduce cost and size of system
  - Design for short distance monitoring
- Develop equipment signature analysis
- Remote com-link setup and operation

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**Need to develop a simpler PipeGuard package for localized monitoring (up to 1000')**

# PipeGuard™ Advanced Development - Phase II

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National Grid  
Hicksville, NY  
Kick-off Meeting  
November 10, 2010



**NYSEARCH**



# PipeGuard™ Phase II

Funded by DOT/PHMSA and NYSEARCH

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## □ Objective:

- Develop an Advanced PipeGuard™ system specifically for distribution pipelines
- Achieve consistent and reliable remote alarm notification to meet targeted specs

## □ Targeted Specifications:

- >95% alarm detection rate (target 99%)
- No false alarms
- System coverage—800 to 1000 ft (2 units)

# Advanced PipeGuard™ Benefits

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- ❑ Real-time remote monitoring to prevent excavating damages on critical pipeline sections
- ❑ Reduce operating costs & improve safety–24/7 coverage
- ❑ No other technology can detect all types of nearby excavating activity
- ❑ Can be easily installed as permanent or temporary system

# Phase II Workscope

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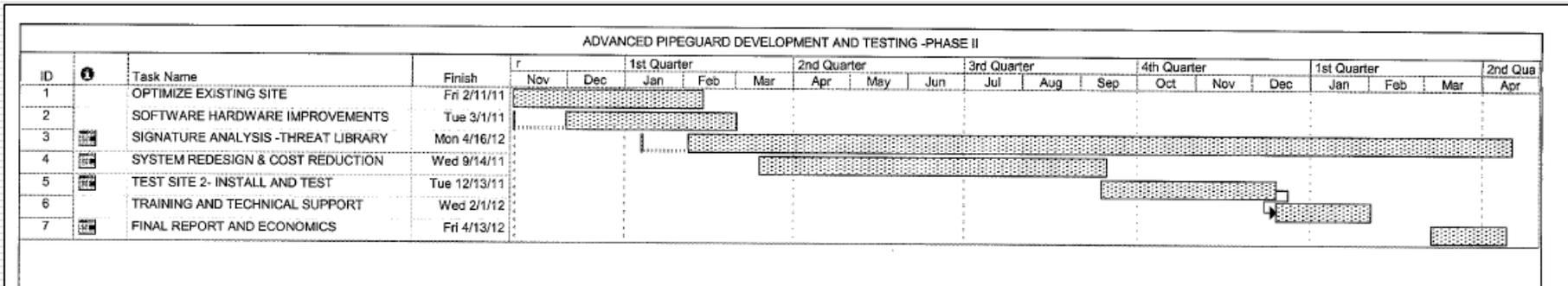
- Task 1- Optimize existing system
  - Provide test at Test Site # 1
- Task 2- Modify software/hardware
  - Improve detection sensitivity/confidence level
    - Algorithm improvements
- Task 3- Develop signature analysis
  - seismic signatures for backhoe
- Task 4- PipeGuard™ redesign
  - Reconfigure geophones if needed
  - Improve System reliability and reduce costs
    - Simplify control units
    - Wireless communications

# Phase II Workscope-cont'd

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- Task 5- Test site # 2 with upgraded system
  - Select site, install and test
  - Analyze and catalogue signatures
  - Make adjustments/calibrations as needed
  - Monitor and test site for 3 months
- Task 6- Training/Technical support
  - Develop operations manual for LDCs
  - Develop and provide “train-the-trainer” program
  - Senstar to provide technical support
- Task 7- Reporting and Economics

# Schedule & Deliverable



Total Phase II Program – 18 months

**Deliverable:** Two fully operational field-proven PipeGuard systems with personnel trained in its use

# Getting Started!

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- Identify responsibilities of team participants
- Identify project leaders for each group and location of control laptop
- Determine appropriate com-link
- Address remaining action items from Phase I
- Develop action plan for Task 1