SENSIT Technologies

Innovative Detection Solutions

Energy - HVAC - Industrial - Safety

Ultra-Trac® APL

Acoustic Pipe Locator

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Session Agenda

1. SENSIT Technologies Overview
2. Ultra-Trac APL Overview
3. The Challenge
4. Project Goals and Product Development
5. How the APL works
6. APL features and operating tips
7. Case Studies
8. Review and Q&A

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SENSIT Technologies

Founded in 1980, Sensit Technologies serves the Natural Gas, Propane, HVAC, and Fire Service markets in 60 countries

Sensit products are designed, manufactured, and serviced at our factory in Valparaiso, Indiana USA

SENSIT Technologies brands include Sensit, Trak-It, Gas-Trac, Smart Cal, Ultra-Trac

ISO 9001:2008 certified company

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Ultra-Trac APL Product Overview

- State-of-the-art acoustic technology
- Accurately locate unmarked buried pipe
- Find plastic pipe with broken or missing trace wire
- Interface with tablet (optional) for enhanced pipe mapping

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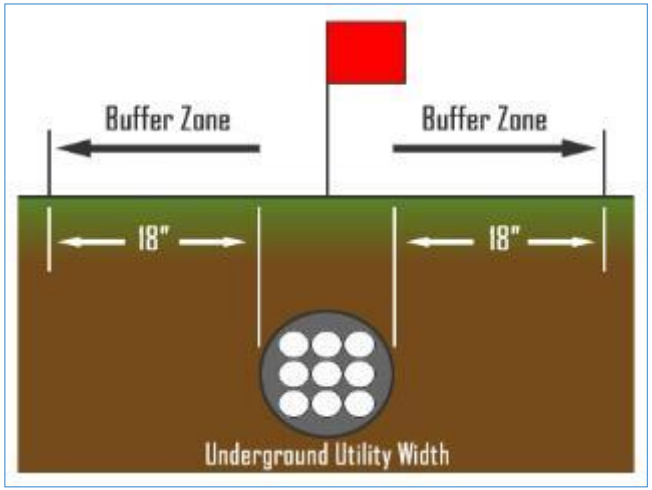
The Challenge:

Locating underground pipe not locatable by traditional methods



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Ultra-Trac APL
- Early Product Development

- Project launched in late 90s
- Funded through GTI, GRI, PHMSA, OTD
- Significant utility support
- Licensed to SENSIT Technologies for commercialization in April, 2011 by GTI
- Market introduction in December, 2012

Product Development Goals

- Locate unmarked pipe
  - All types of pipe
  - Gas
  - Water
  - Sewer (cross bores)
  - Electric conduit/cable
- Locate pipes under soil, grass, concrete, asphalt, and other ground covers
- No utility access required
- Easy to operate
- Detect multiple pipes

APL product features

- Finds piping with missing or broken trace wire
- Easy to use, immediate response
- No system access required
- Locates all types of pipe
- Works over asphalt, concrete, grass, gravel, and soil

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Principle of Operation

The Ultra-Trac APL uses the principle of ***acoustic impedance mismatch*** to locate pipe

- Pressing the Scan button sends a sound wave from the APL into the ground
  - The velocity and strength of the sound wave will be different in soil compared to pipe, regardless of type, or other interferences, causing an impedance mismatch in the signal
- When the sound wave hits interference, the acoustic impedance reflects some of the energy in the sound wave back to the APL's accelerometers
- The APL measures the strength and speed of the reflected wave. Based on the return signature, the APL determines if a mismatch is present
- A series of scans over pipe will produce a trend that can be mapped

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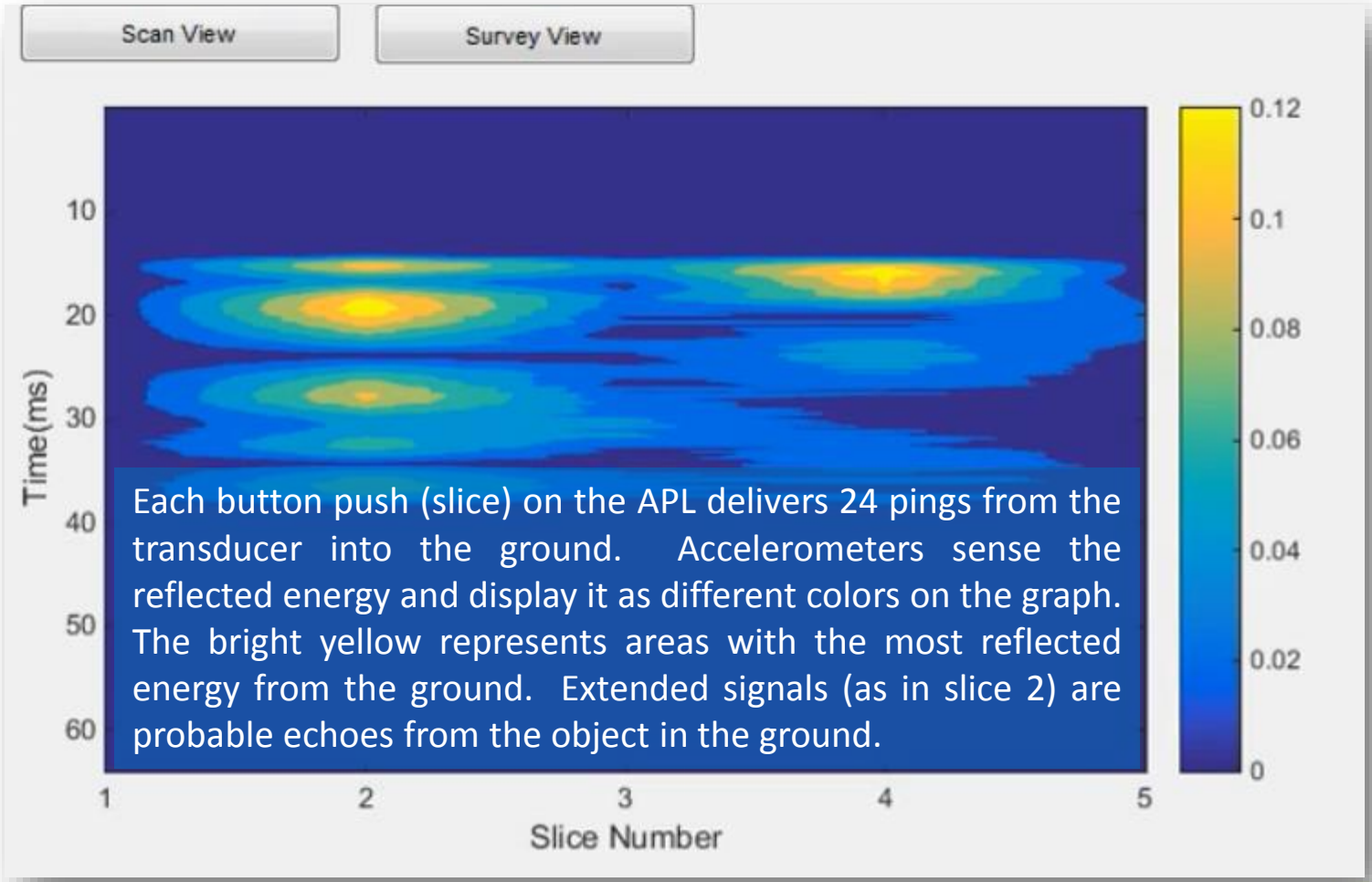
Pipe Mapping

- how it works



Each button push (slice) on the APL delivers 24 pings from the transducer into the ground. Accelerometers sense the reflected energy and display it as different colors on the graph. The bright yellow represents areas with the most reflected energy from the ground. Extended signals (as in slice 2) are probable echoes from the object in the ground.

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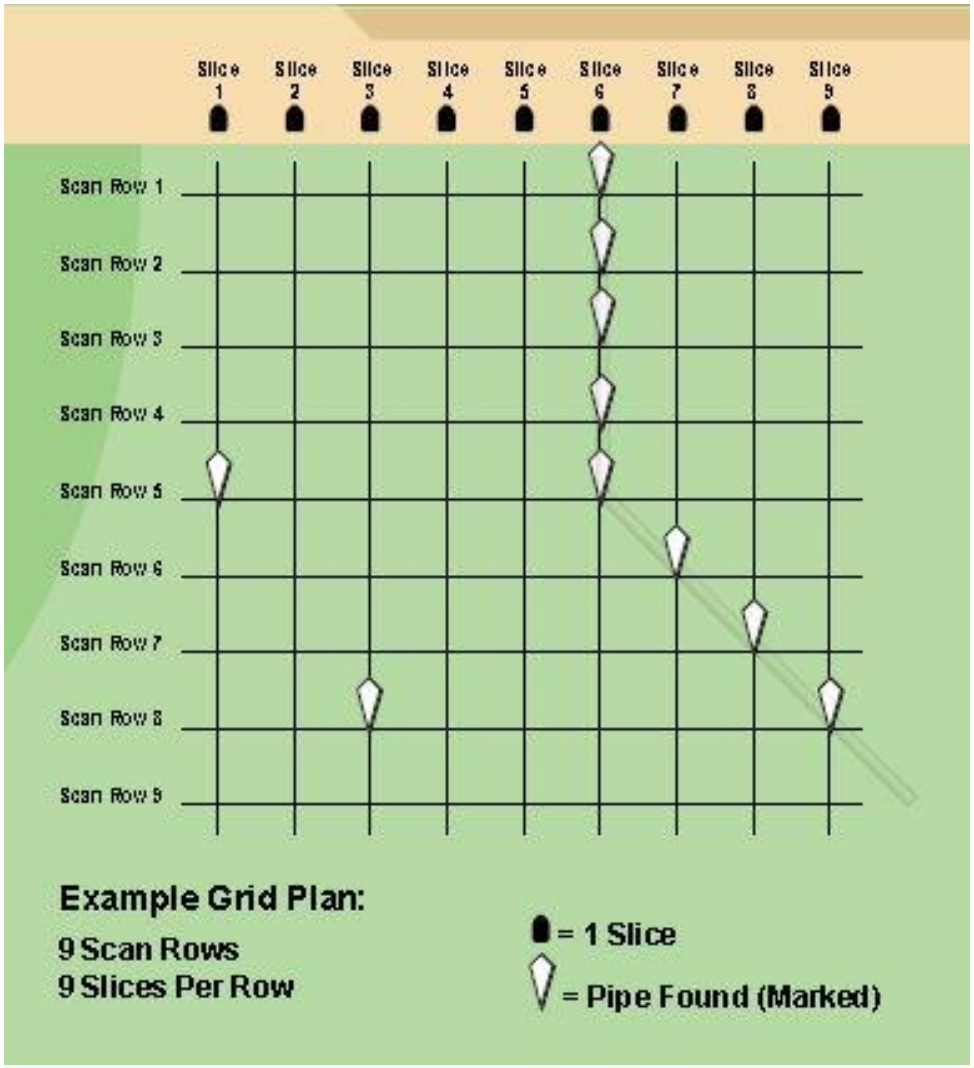
Locating Pipe with the APL



- Establish a grid, starting edge, and slice and scan widths
- Align APL with the starting edge and take the first slice of the scan
- When prompted, move the proper distance to perform the next slice(s)
- After reaching your predetermined scan width, select “Map Pipe”
- Mark the ground based on the “pipe found” locations from the APL display
- Perform additional scans to adequately cover the search area
- Align markings to identify probable pipe locations
- Lone marks may be rocks or other anomalies in the ground

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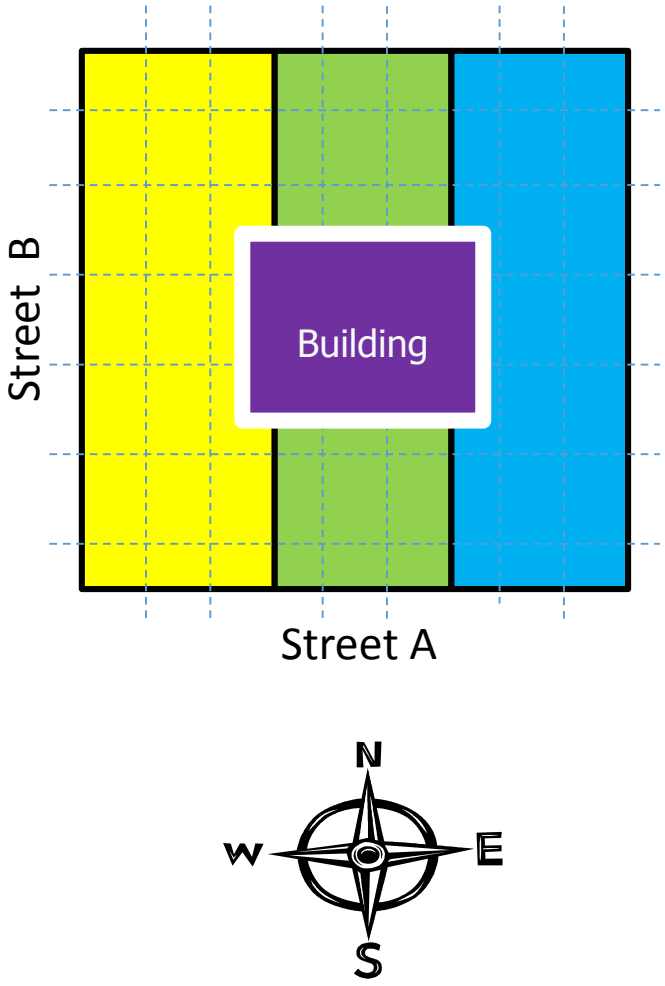
Tips for establishing the search area



- To organize the search, grid the property in equal segments
  - Recommend <12’ wide in urban area
  - Divide large properties several times
  - Make the grid as small as practical for the application
- Start by establishing a starting line (edge)
- If the property does not have a building, use a compass to organize search and establish reference points
- Match results onscreen to the tape measure or the preset grid. Mark hits with paint or flags
- A single scan (row) is not an adequate search

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Operating tips for the APL

- Perform scans on one type of surface at a time (asphalt, grass, concrete, gravel)
- Softer materials requires narrow 6” slices (sand, gravel, new construction)
- Large cracks, curbs, expansion joints may produce false readings
- Measured slices and consistent procedures produce the best results
  - Minimum of 5 slices per scan. (Max 25)
  - Perform enough scans (rows) to adequately cover the search area
  - Slices closer together allow better accuracy for small or shallow pipes
  - 12” slices provide better resolution for deep and large diameter pipes
- Solid ground contact is critical. This is known as “ground coupling.”
  - During a scan, use consistent force on the handle and footpad during slices

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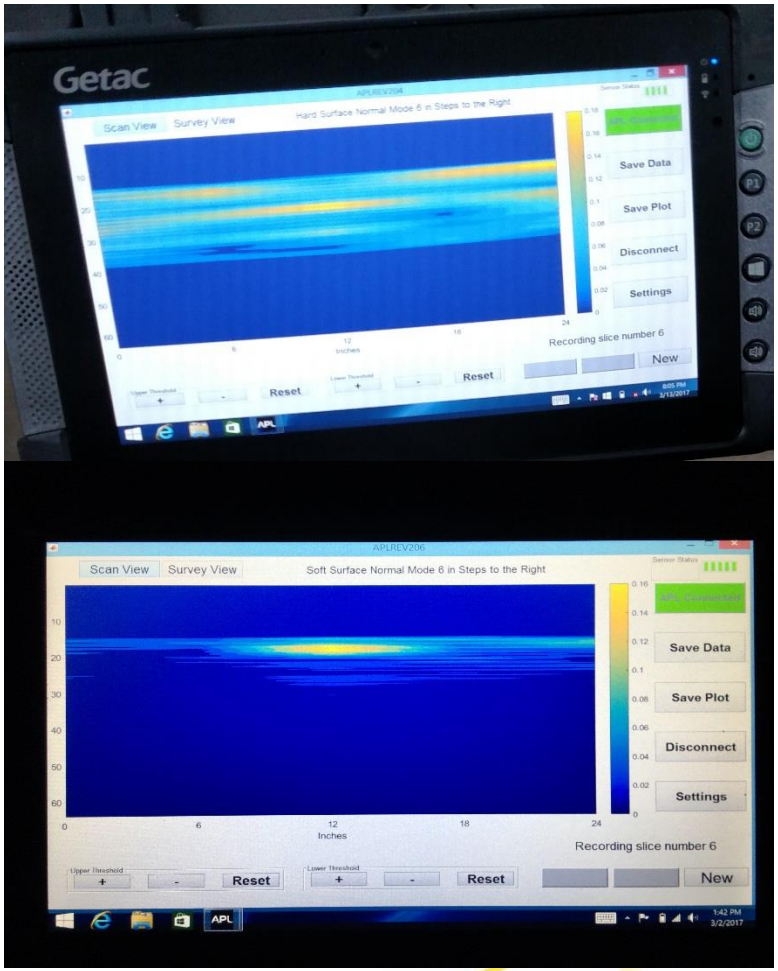
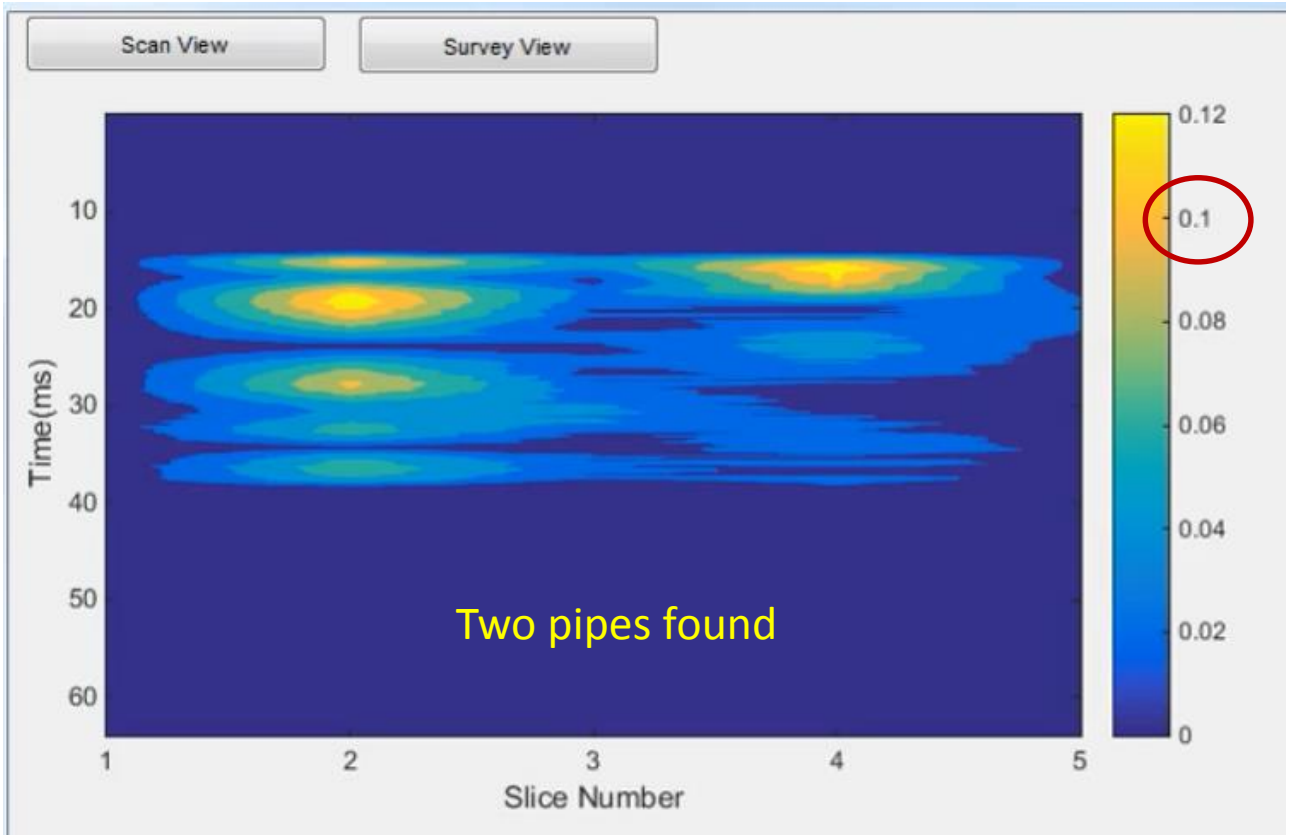
Operating tips for the APL

- Use a tape measure and paint/cones to mark
- First scan on known location when possible
- Change surface type or depth if results are not favorable and scan again
- Minimum 3 scans to determine pattern/location
- Brightest colors (Yellow) and return signals are best indication
- Shift scan position as required



Scan View
- provides a 2D view of a single scan



Numeric signal strength is the key comparative metric between scans. High signal strengths seen in multiple scans usually indicates the presence of pipe.

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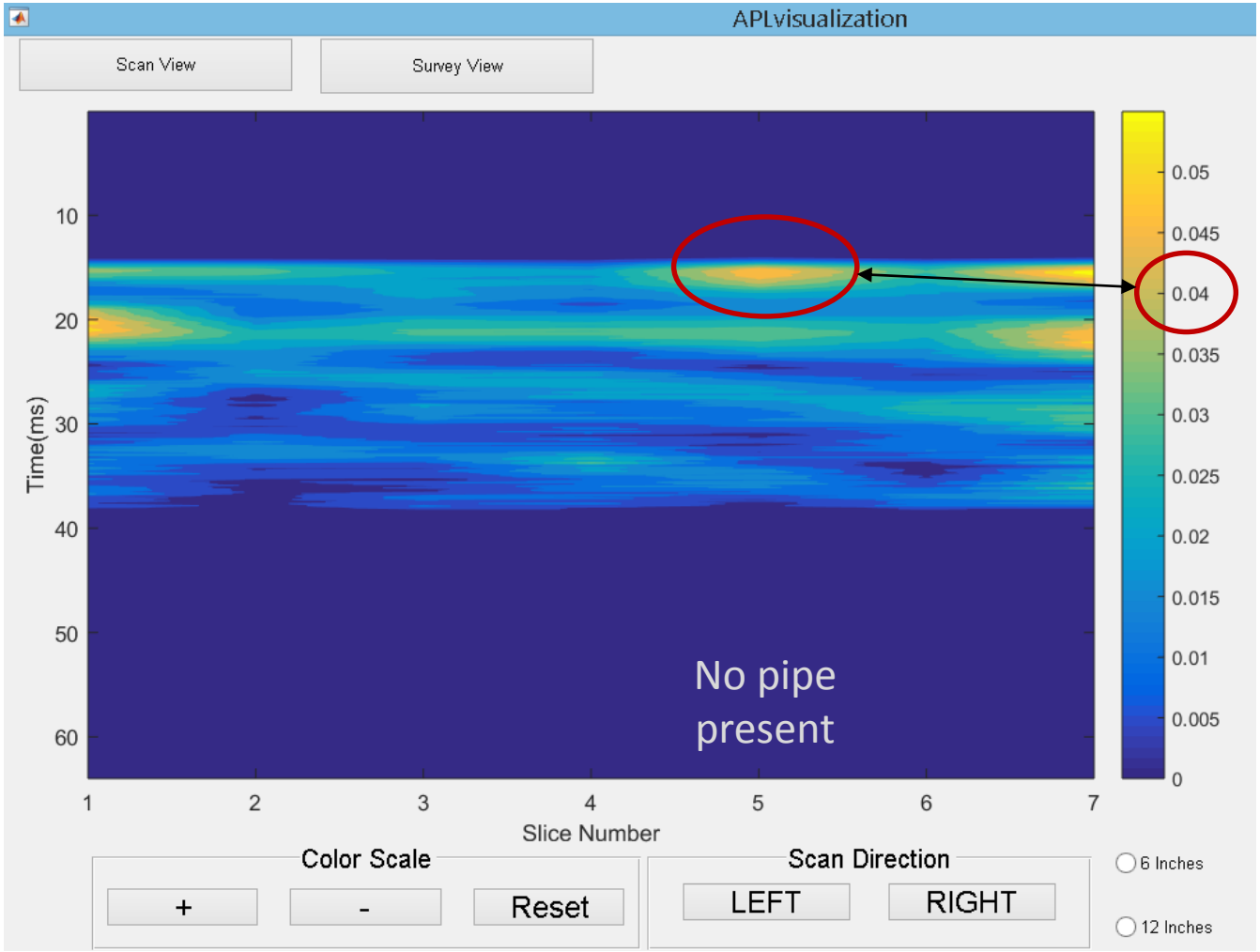
Signal Intensity

- pay attention to the signal's *value* more than the color



Signal strength measured in hundredths is not likely to be from pipe. Indications on first and last slice makes comparative result suspect.

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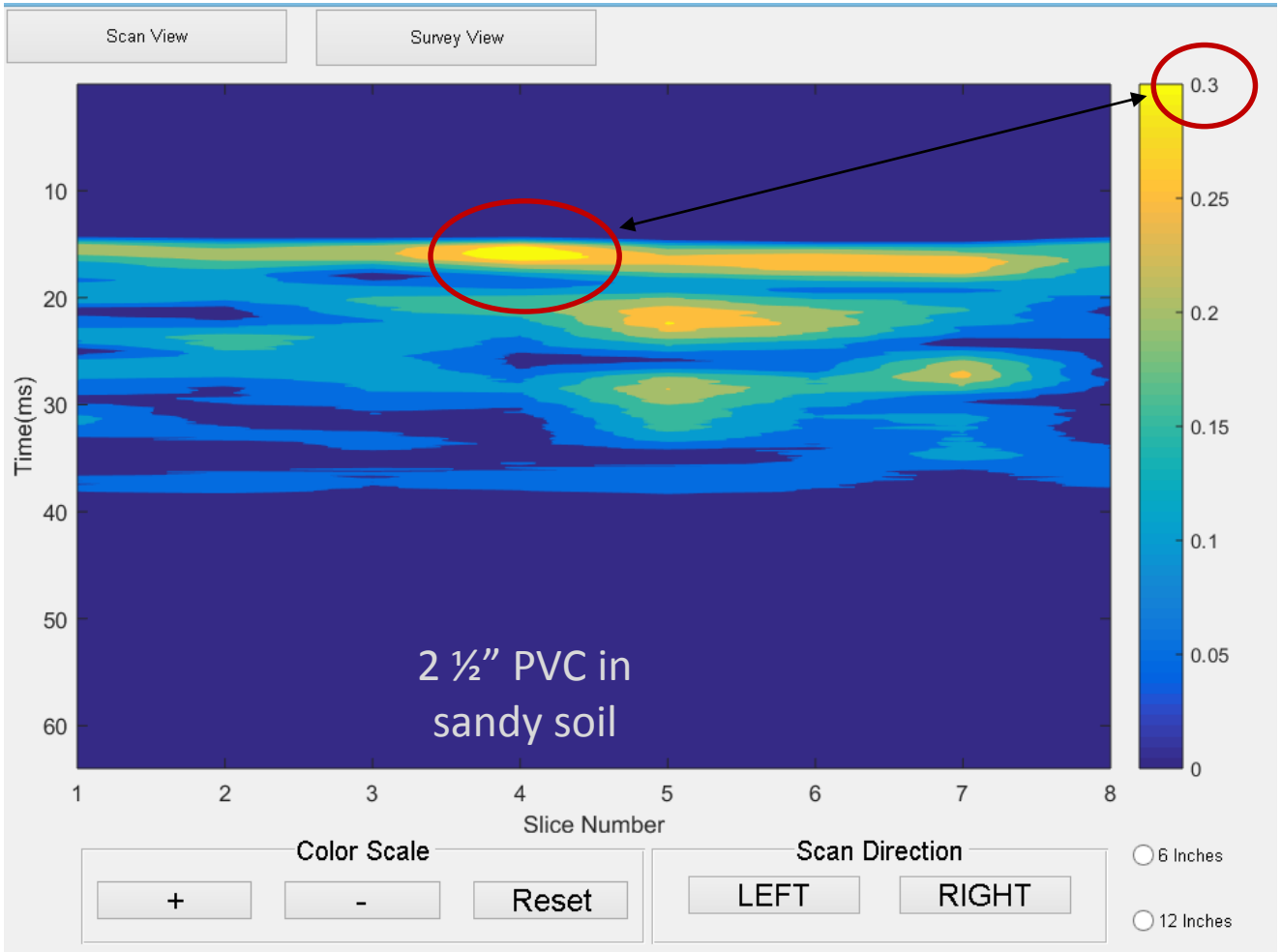
Signal Intensity

- pay attention to the signal's *value* more than the color



The signal strength in this scan is about 7 times stronger than those in the previous slide – a much greater indication of pipe

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Ultra-Trac APL in action

2” PE gas pipe at 42” below grade

1¼” PVC water pipe at 14” below grade

Confirmed both locations by excavation.

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APL in action all around the world

- finding pipes with no trace wire

New Mexico

United Kingdom

APL at Beijing Gas

Beijing Gas used the Ultra-Trac APL to locate a leaking pipe in one of its busy downtown neighborhoods. The APL quickly and accurately located the unmarked pipe, allowing them to dramatically decrease the size of the excavation and improve the speed and efficiency of repairs.

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Wrap-up
and
Q&A