Collecting Multiple Indirect Inspection Results with One Pass

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Data Mining/Threat Assessment Topic

- **"I would like a GPS meter that was designed to integrate with CIS, DCVG, Soil Resistivity, Depth of Cover and ACVG. All this equipment is separate and does not integrate. I have seen CIS meters collect GPS, but not post process sub-meter/sub-centimeter GPS. Since the actual location is in my opinion the most important feature, the GPS equipment should be the center piece to the data acquisition process."**

  - *Hart Smalley, Mears*

Multiple Indirect Inspections

- Field work is expensive & often frustrating.
- Since you're there walking down the ROW, since all the groundwork has been laid (land owners, access, crews, vehicles, miles of trailing wire, etc.) you may as well make the most of it.

GPS

- Now, one of the first bits of data people want to know about their pipelines.
- Where is it, where are the things around it
  - You can now easily measure the distances between points of interest
- The basis of a Geographical Information System (GIS)

Scaleable GPS

- There are 3 common levels of GPS accuracy
  - 'Single-ended' (5-8m) – consumer & non-corrected
    - ~$100-300
  - Sub-meter (better than 1m) – WASS/Omnistar
    - ~2000-5000
  - Centimeter (inch) – RTK correction
    - ~12,000+
- System should be able to use required accy.

GIS

- The data collected is some of the data that can be used to 'fill' the database behind a Geographic Information System.
- Land use, features, water, etc. can all create or improve existing knowledge of the ROW
- GIS functions may include integrity assm't.
- Reports aiding maintenance planning, digs, mitigation are printed based on this data.

Land Use, ROW Features, Notes

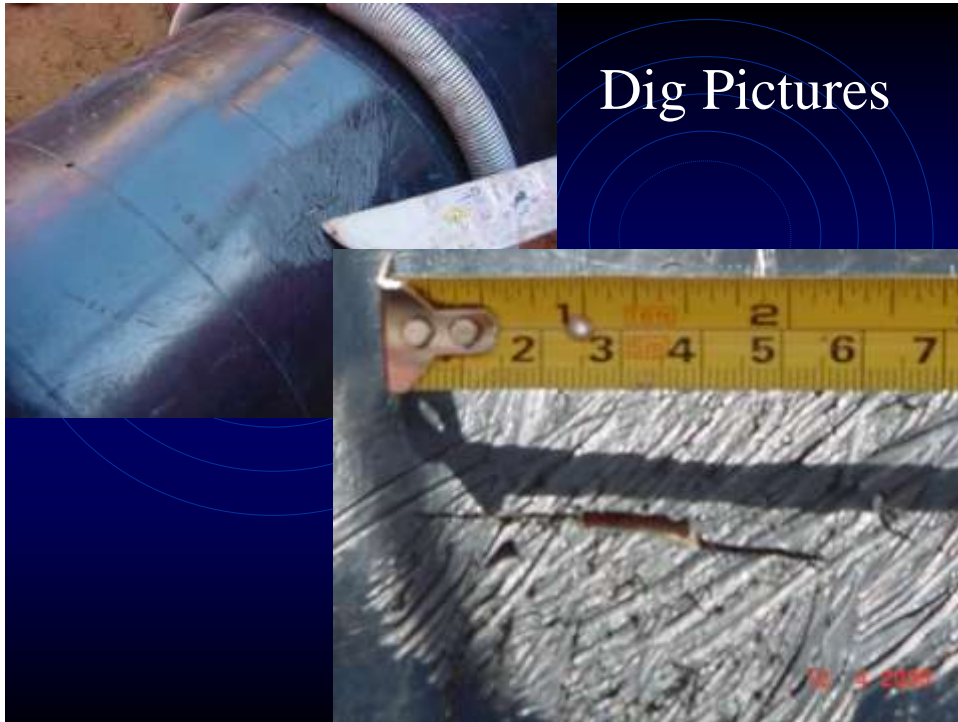- Also very important to GIS - Inventory of:
  - Facilities, valves
  - ROW markers, aerial marke
  - CP rectifiers, test posts,
  - Land use, (arable cropland, native grasses, etc.)
  - ROW access, slope, water bodies, roads, trails
- Open text fields to accompany survey and/or be printed on reports.

Digital Photos

- A picture is worth 1,000 words.
- Document activity

Dig Pictures

Nearby Building / Population

- Laser Range Finders can give bearing, distance and elevation to nearby structures
- Add this to data collector as input source
- Data Collector software features pull-down lists to classify structures, count population.
- PC software adds up to create HCA segments, count popl'n.
- 1000m range, 0.1   resolution

Pipe Locator

- Locate Training is a must.
- Locator keeps you on top of the pipe while the GPS is collecting data.
- May also include other tests ACCA/ACVG.
- Locate position data may show up on data collector screen, reducing the number of devices you need to look at.
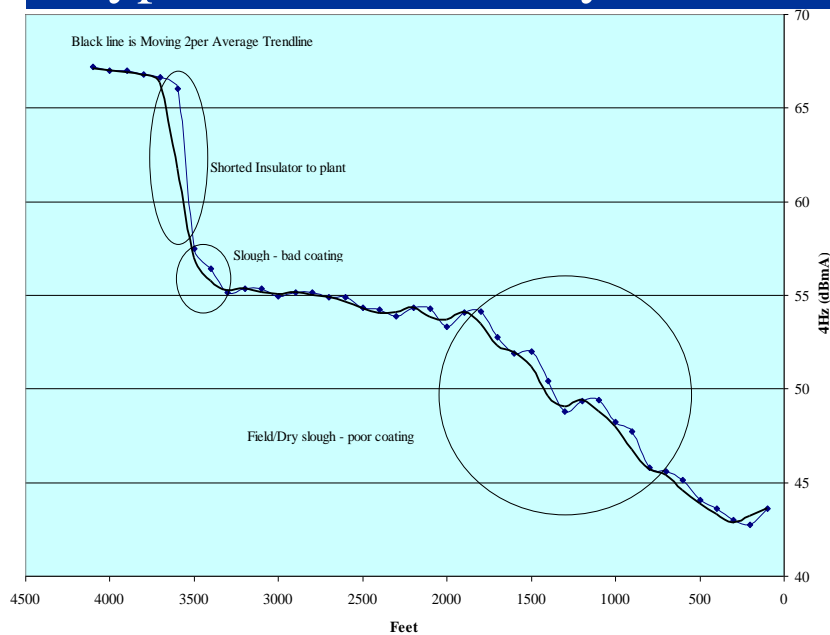
Pipeline DOC

- Used correctly, a locator should be within 5%
- Modern ones do not require calibration
- Shallow pipe is a major threat to safety
- Don't forget to account for a radius
  - All locators report depth to <u>centerline</u>, ideally the software should do this calculation on the fly
- A couple brands communicate with data collector thus reducing data entry.

ACCA Introduction

- AC Current Attenuation
- A method of determining coating quality from above ground.
- Simply: Current is generally lost where there are coating problems.
- Apply a known current and measure at distance intervals to see where it is lost.
- More loss/distance = worse coating.
- Current loss can also indicate unknown connections, insulator and casing problems

Typical ACCA Survey Results

Black line is Moving 2per Average Trendline

Shorted Insulator to plant

Slough - bad coating

Field/Dry slough - poor coating

4Hz (dBmA)

Feet

ACVG / DCVG

- AC Voltage Gradient
- Like DCVG / Pin-to-pin / similar but uses a transmitter, not the CP DC
- Sizing similar to DCVG

CP Close Interval Surveys

- Now have processing power to show full waveform,
  - You can see full curve of interruption, ensure that period is suitable.
- Tag reading(s) as P/S, near ground, far ground, IR met.
- Properly filtered voltmeter will not usually see effect of locate transmitter.
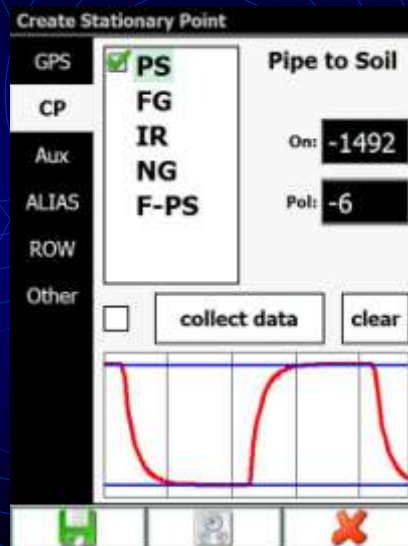
Sonar / Water Depth

- For water crossings, this is a very good way of finding both the depth of water and the depth of the pipe.
- Subtract the depth of water from pipe DOC to find depth of cover under water

Leak Surveys

- Some methane detectors have serial data or analog level outputs.
- Survey systems can also record this data, giving a documented position and concentration of the leak.
- Can record concentration continually or just when instructed.

Raw data logs

- Can provide additional data security and operator auditing
- May record *all* inputs continually, showing where the operator was, when, speed, etc.

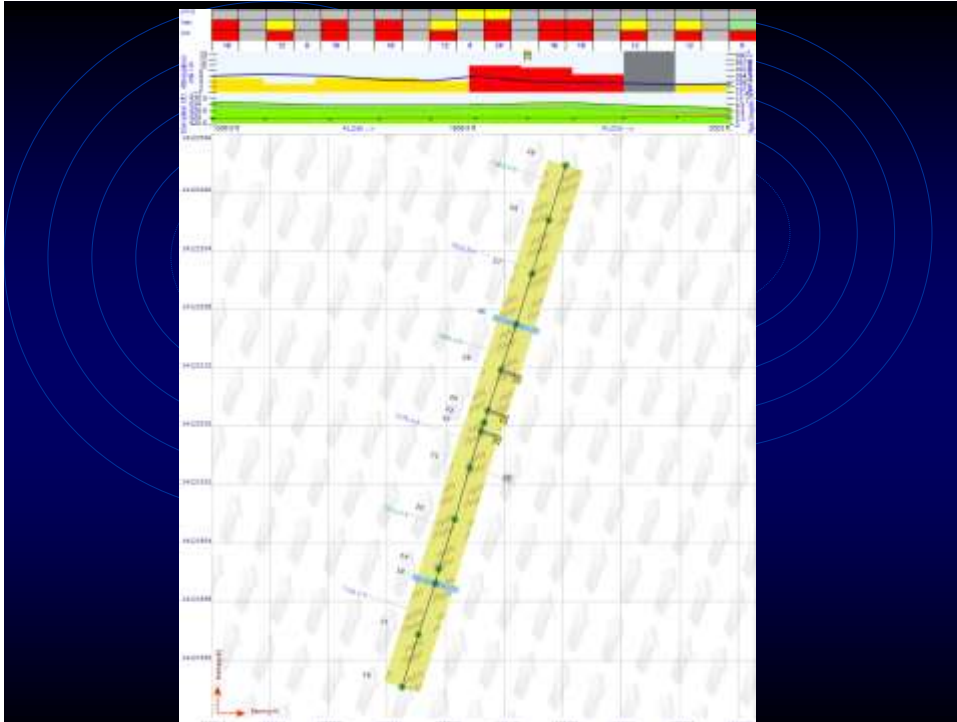# Putting it all Together

Bringing Data into PC

Report Generation

- This is what took a lot of time AND delayed both cash flow and acting on the data.
- Every hour of field work may take ½ to 2 hours of office work to compile the data and create meaningful charts & graphs.
- This is where programming has improved the process.

Thank You

- Questions?

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