

AUTOMATED BAILODOWN TESTS

Better, Cheaper, Safer Data

Andy Pennington & Jonathon Smith

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LNAPL Baildown Tests – Easy, Right?



Baildown tests are hard –

- Use field time efficiently
- Document complete NAPL recovery
- Collect enough data to identify confined or perched conditions
- And do it all safely!

Manual Data Collection Problems

- Missing key data overnight
- Cutting test short for budget/efficiency reasons
- Sparse data for very fast recovering wells
- Repeated access to well locations

“Things got back to equilibrium sometime before 7 AM...”

“Should I stay out here another day to get one more measurement?”

“I’m gauging as fast as I can!”

“I need track protection for 5 minutes every hour...”

Good Data Supports Risk-Based LNAPL Management

Improving the Measurement Concept

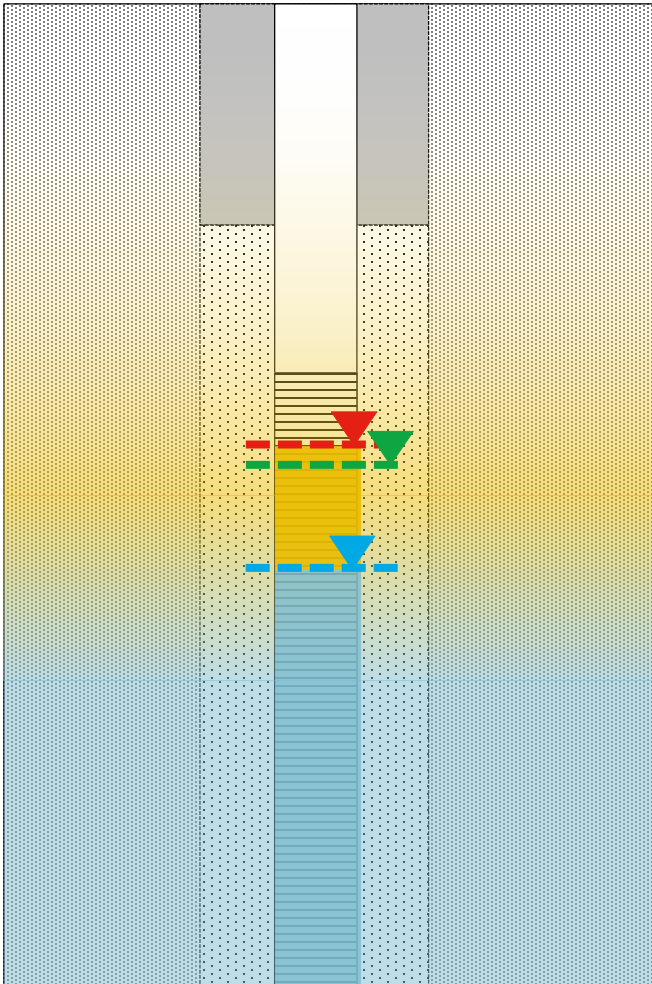
Can we build a datalogger to measure LNAPL thickness, and...

- Get better, more continuous data?
- Avoid field inefficiencies?
- Reduce access and safety concerns?

Less Staff Time Here



Resolving In-Well LNAPL Thickness



Three related data points:

- ▼ Air-NAPL Interface
- ▼ NAPL-Water Interface
- ▼ Potentiometric Surface

We can reliably measure:

- Potentiometric Surface
- LNAPL density

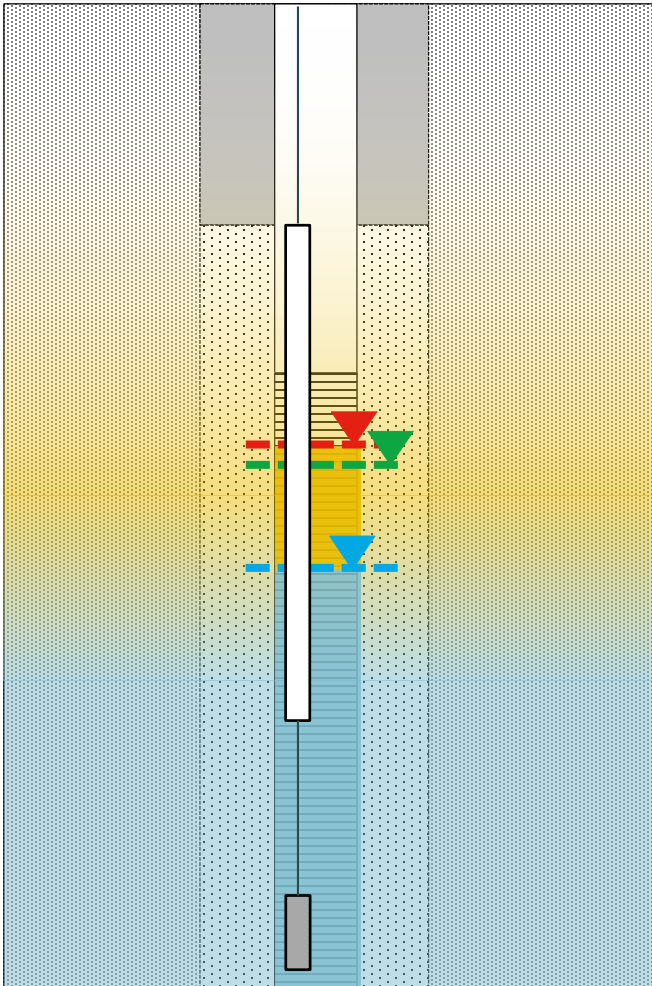
Measured

One interface
+
Potentiometric
Surface
+
LNAPL Density

Calculated

Second
Interface
+
LNAPL
Thickness

Measurement Concept



- Pressure-Sensitive Tape (eTape) measures Air-LNAPL Interface ▼
 - Hang in well at a fixed depth
 - Electrical resistance of eTape changes with fluid pressure (LNAPL or water) on PTFE envelope
- Transducer measures potentiometric surface ▼
- Programmable datalogger collects readings and saves to SD card
- NAPL thickness and NAPL-water interface calculated using LNAPL density ▼

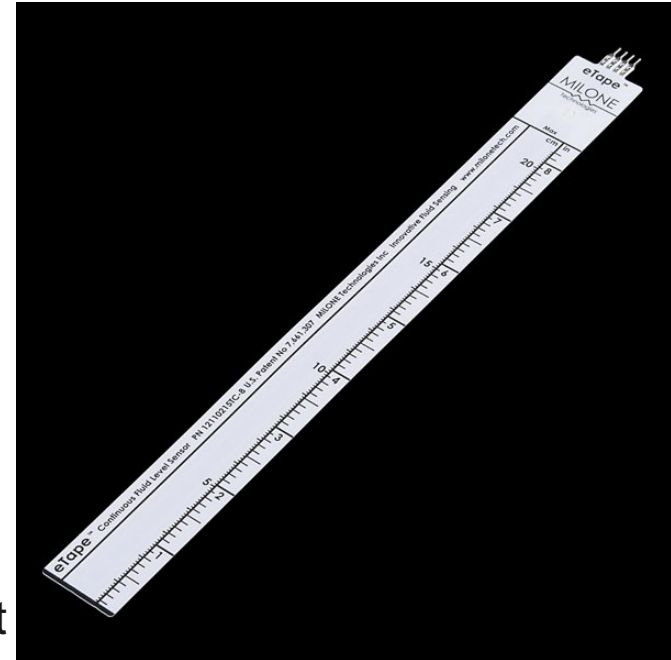
Equipment



Waterproof case with:

- Electronic datalogger
- Intrinsic safety barriers
- Wireless router
- Internal or external 12V battery

Metal frame for down-well equipment

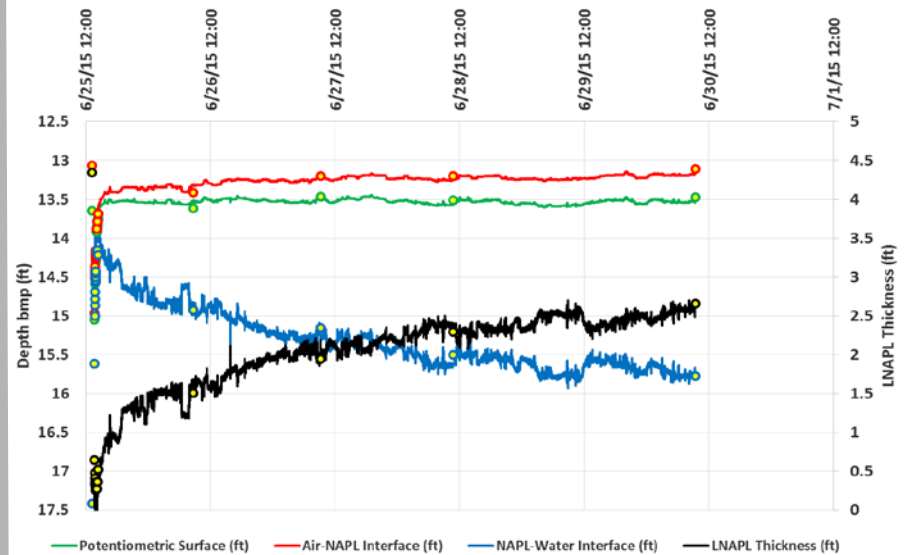
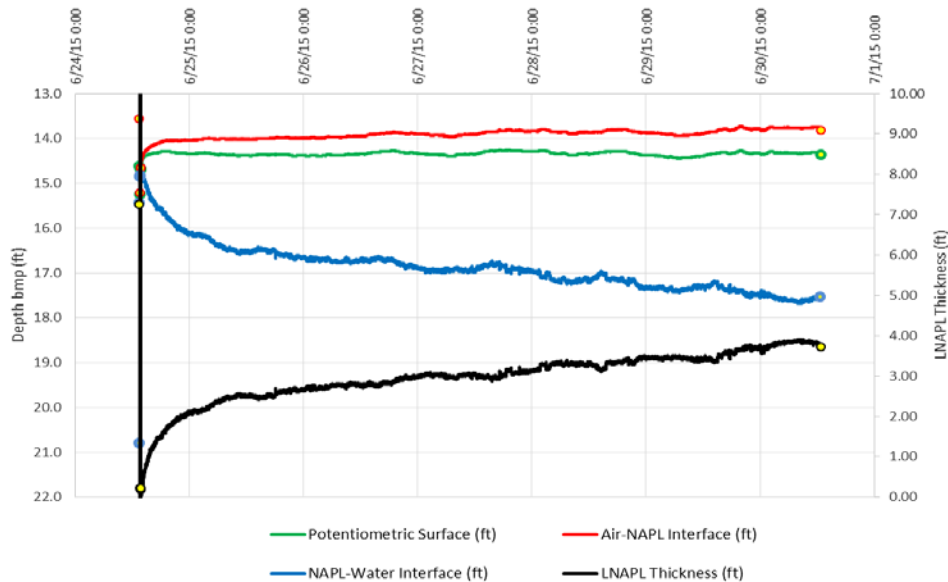
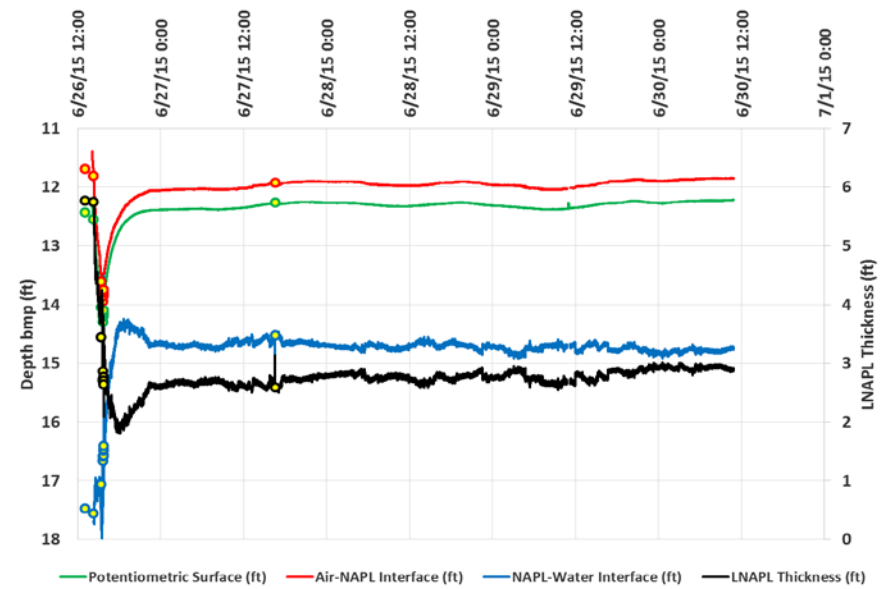
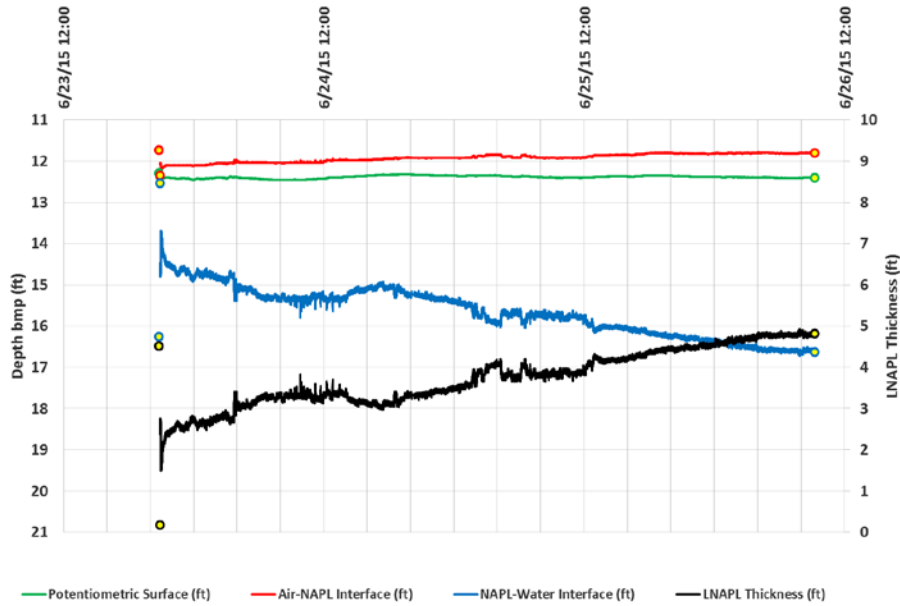




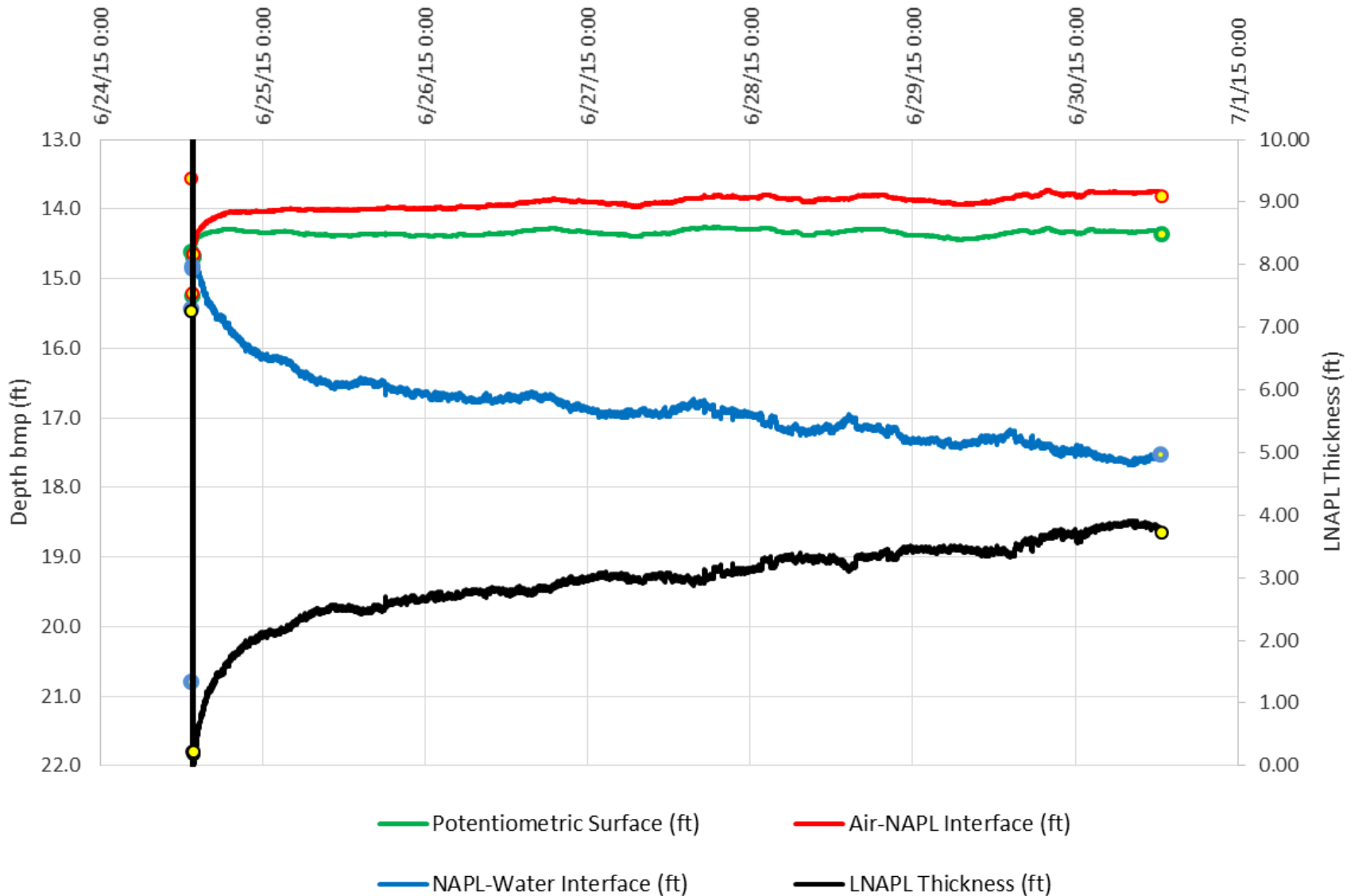
Field Trial

- Baildown testing program in June 2015 – 8 wells
Some key wells in high-traffic/difficult to access areas
- Wells with large initial thickness, slow recovery
- Built three automated data collection units

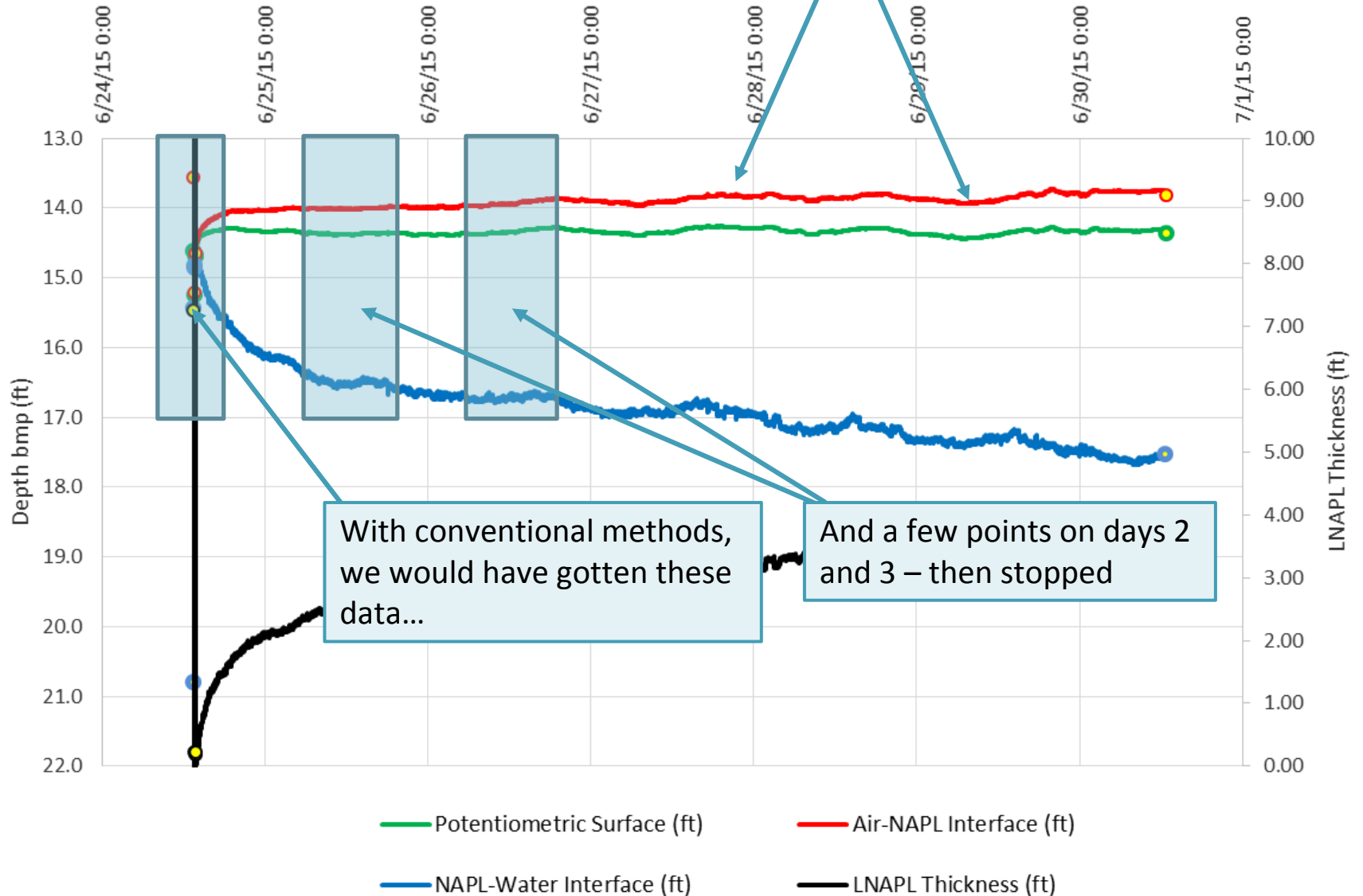
Results



Well 1

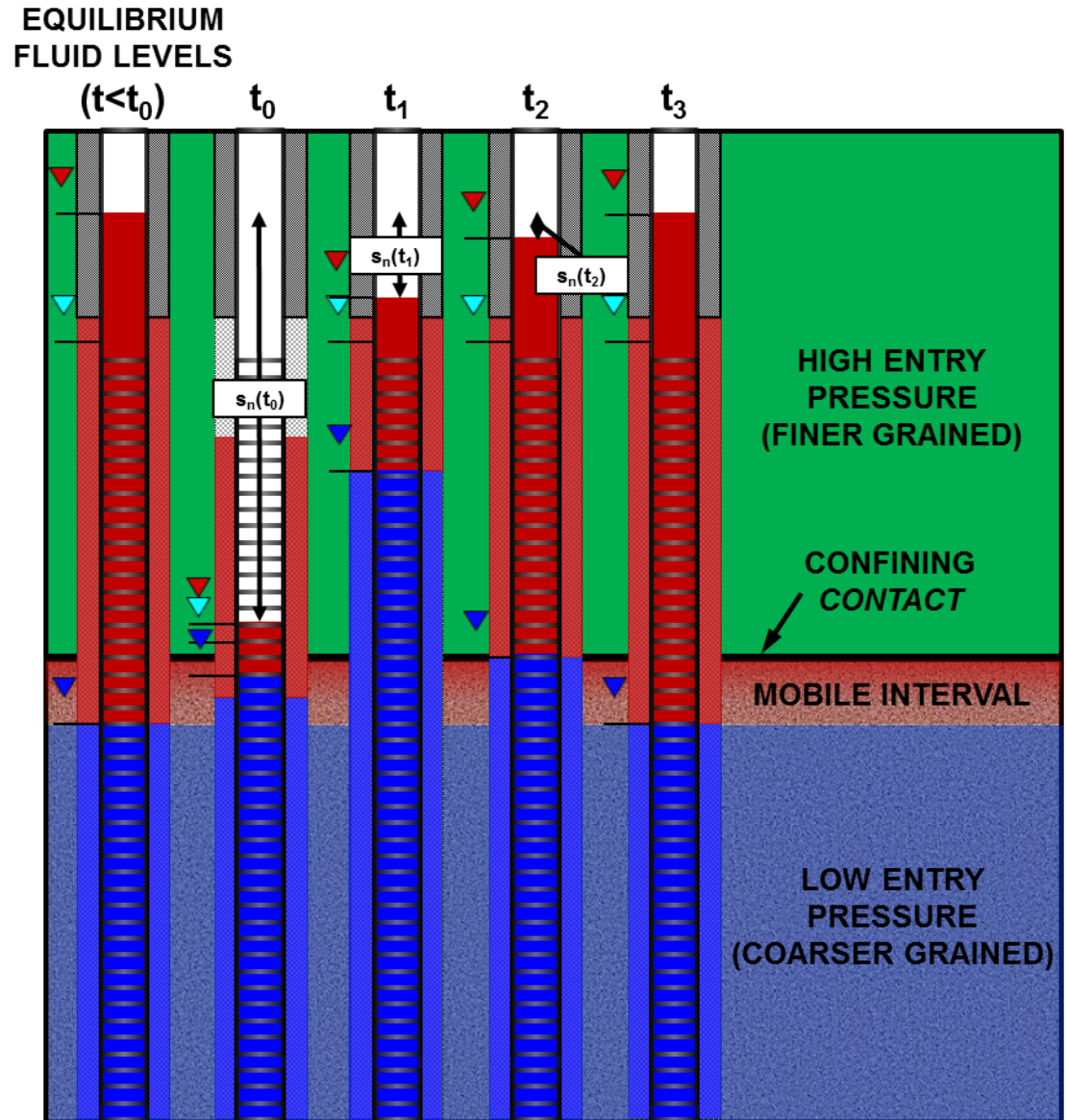
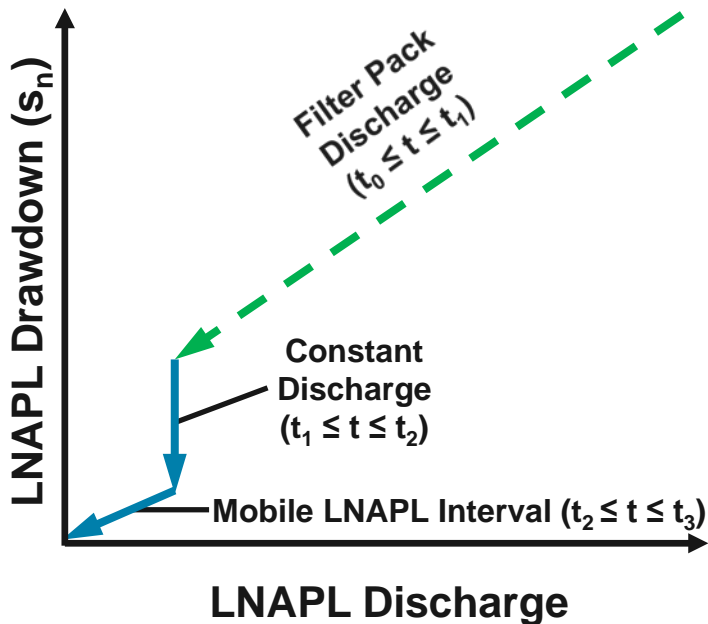


Well 1



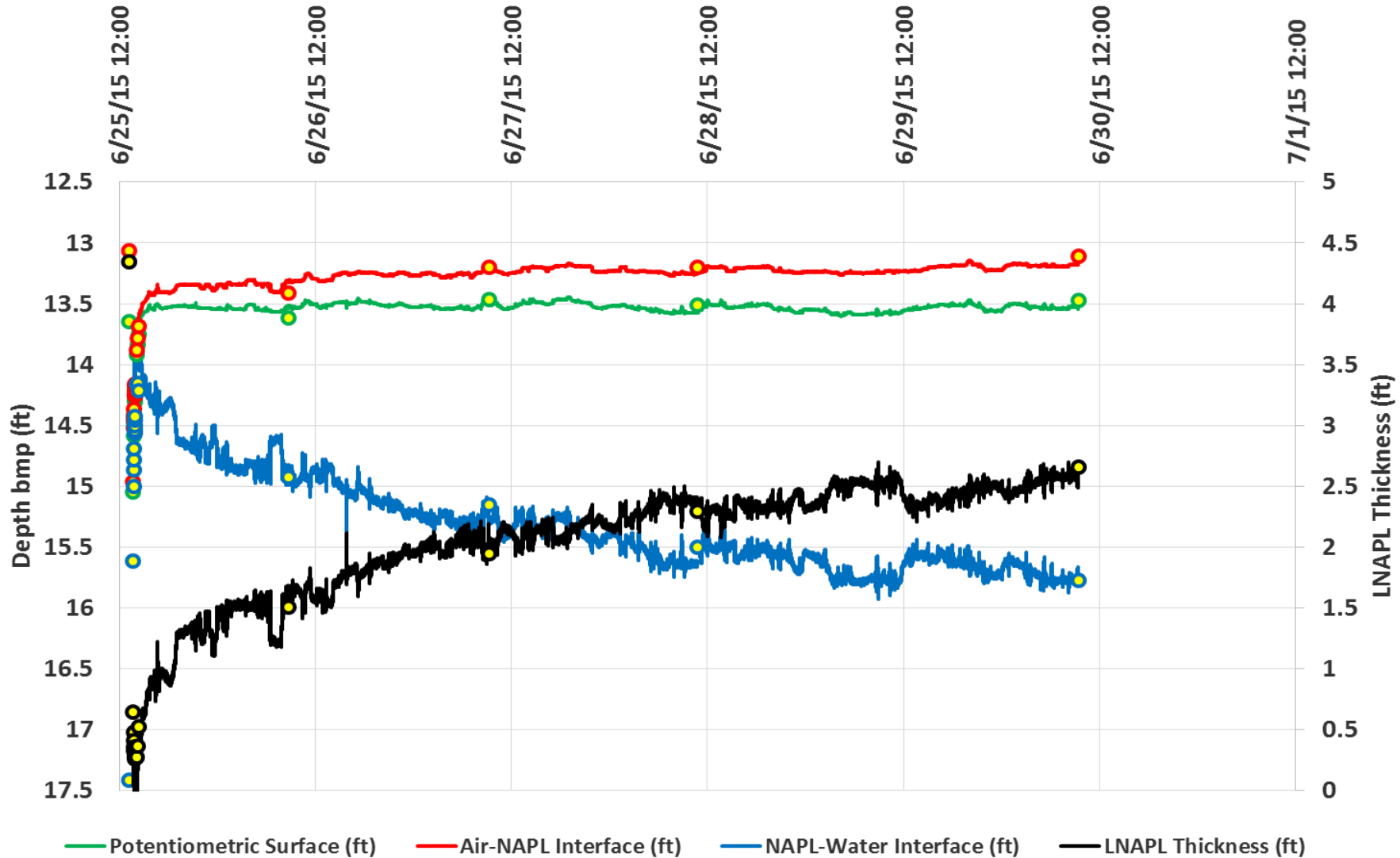
Better Data

- Dense data points can help confirm confined LNAPL conditions (verifying CSM)



Modified from Kirkman (2012), ASTM International (2014)

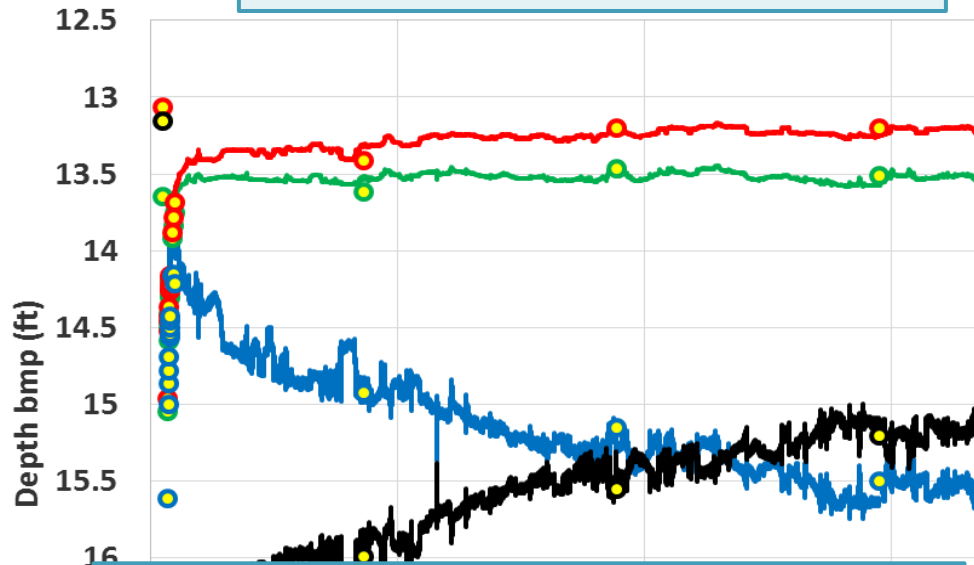
Well 2



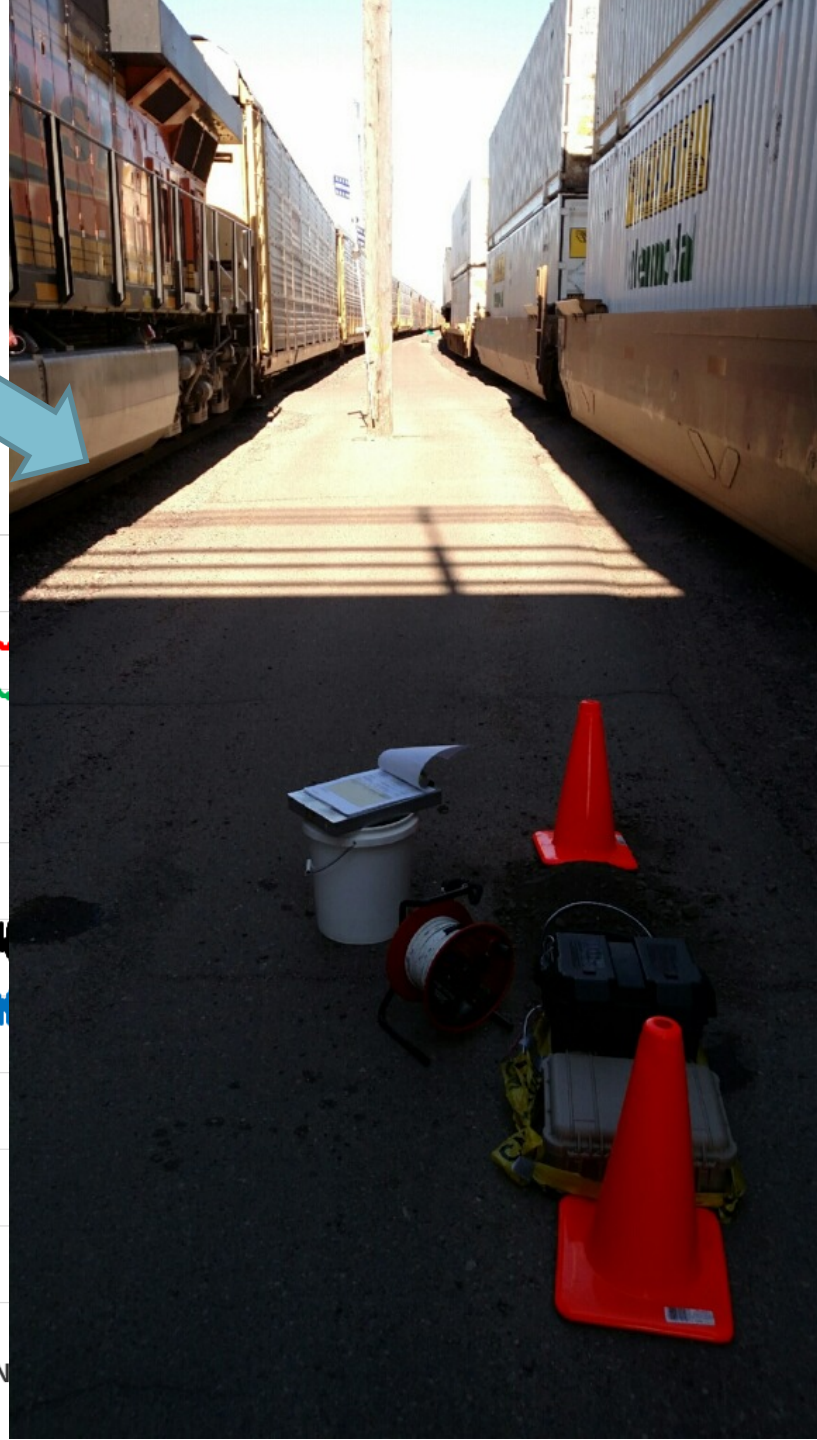
Well 2

6/25/15 12:00

Field staff can be here for an hour setting up, and then let the equipment run... rather than walking back repeatedly to gauge the well.

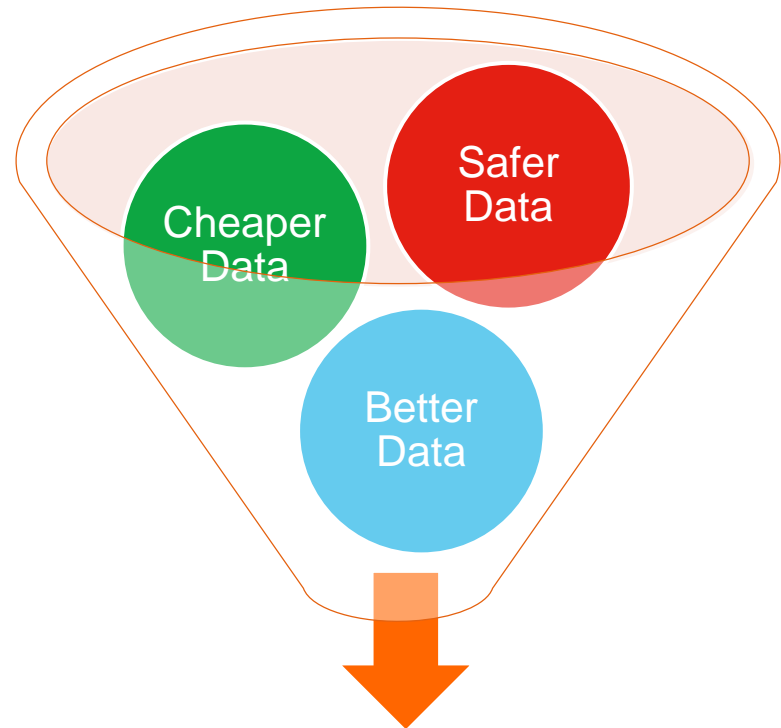


- Continuous data for 5 days at a high-traffic/high risk location
- Reduce track time needs and improve safety without losing data
- Check on and download data wirelessly from a safer location



Summary & Questions

- High-density data sets
- More confidence in results
- More efficient field time
- Safer work in high-traffic areas



**Continuous Improvement in
LNAPL Management**

Arcadis is pursuing a US patent and more field trials