Using Ultraviolet-Induced Fluorescence to Enhance an LNAPL Conceptual Site Model

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ENVIRONMENTAL WORKS

Using Ultraviolet-Induced Fluorescence to Enhance an LCSM

- Technology introduction and background
- Technology Uses
- Case Study
  - Background and Initial LCSM
  - LNAPL fluorescence work
  - Updated LCSM and outcome
- Summary

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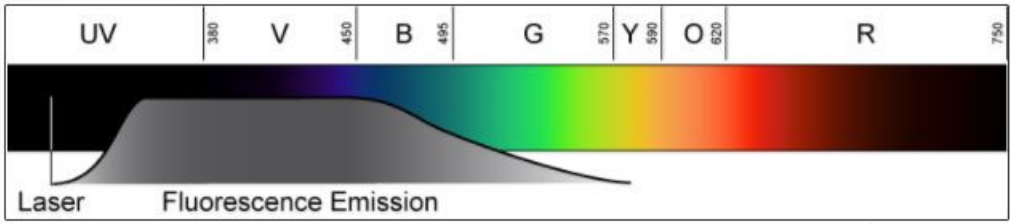
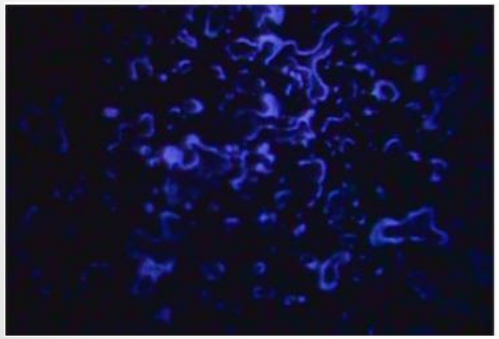
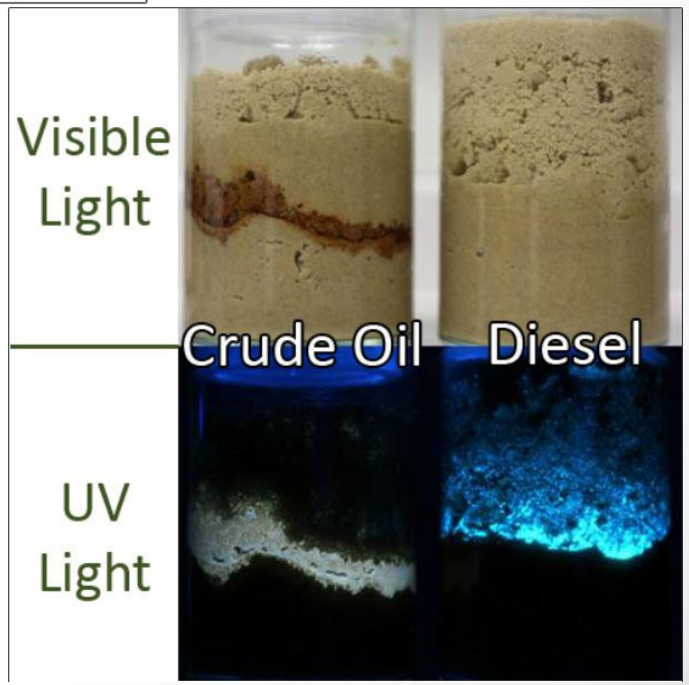
Technology Introduction

- LNAPL fluorescence







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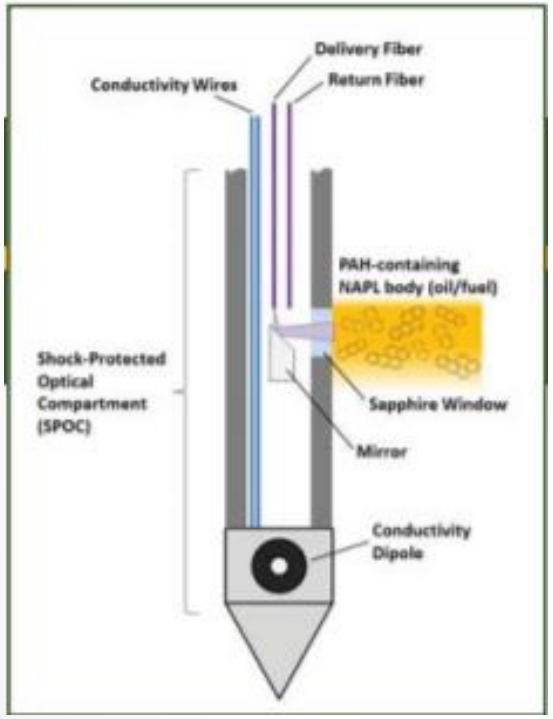
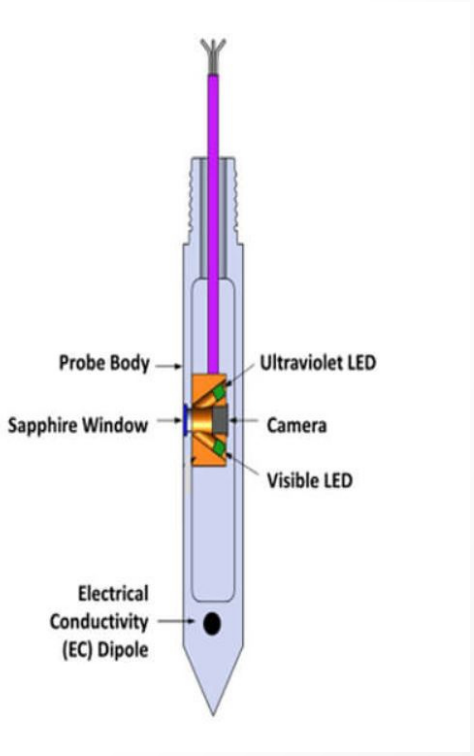
*photos courtesy of Geoprobe and Dakota Technologies

Technology Introduction

- Fluorescence logging tools





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Technology Introduction

- DPT tooling

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Technology Uses

- Timely LNAPL characterization
- Quickly document general soil type
- Quicker understanding of LNAPL lateral distribution
- Help select soil sample locations
- Real-time field decisions
- Enhance remedial design

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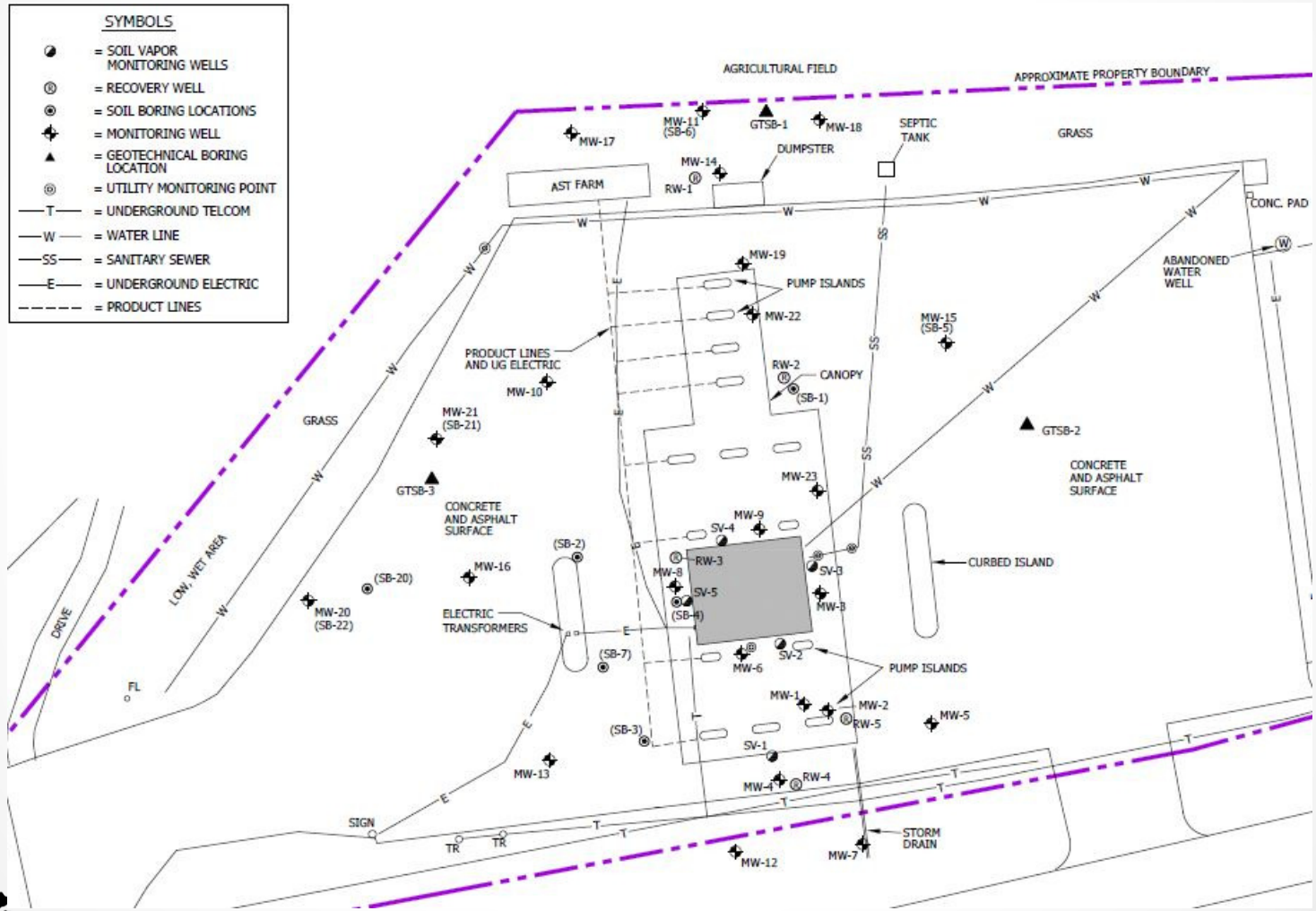
Case Study



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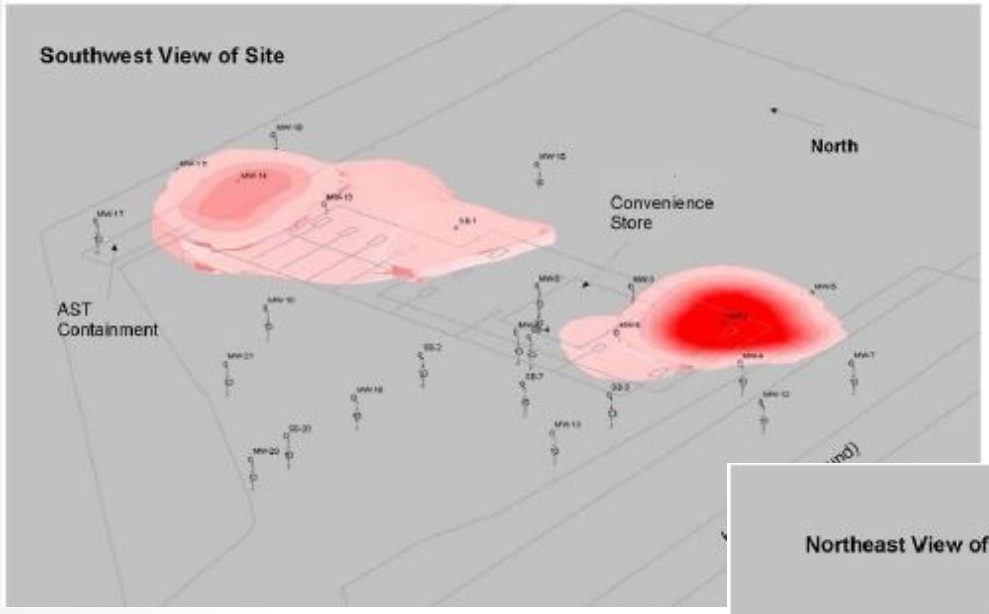

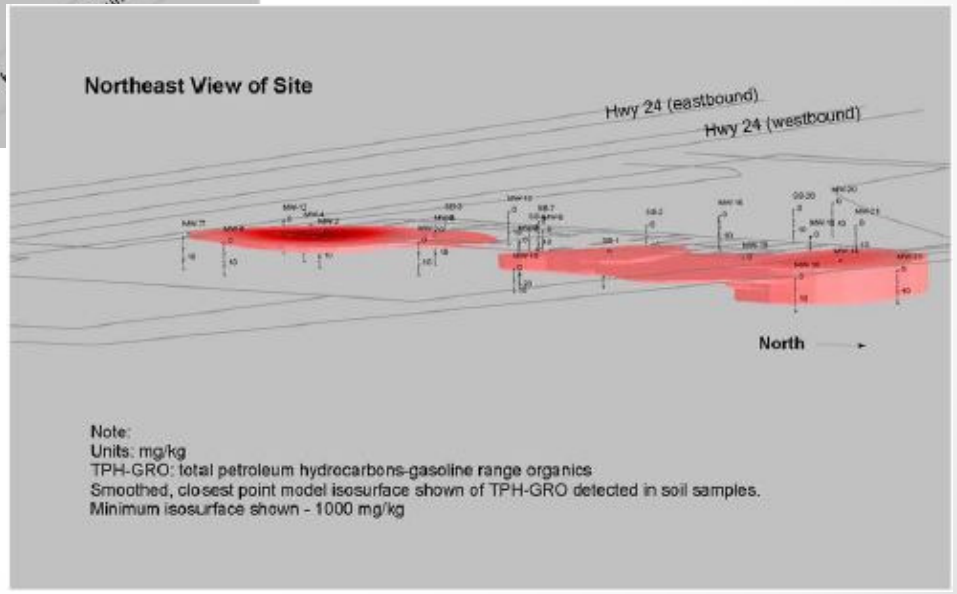

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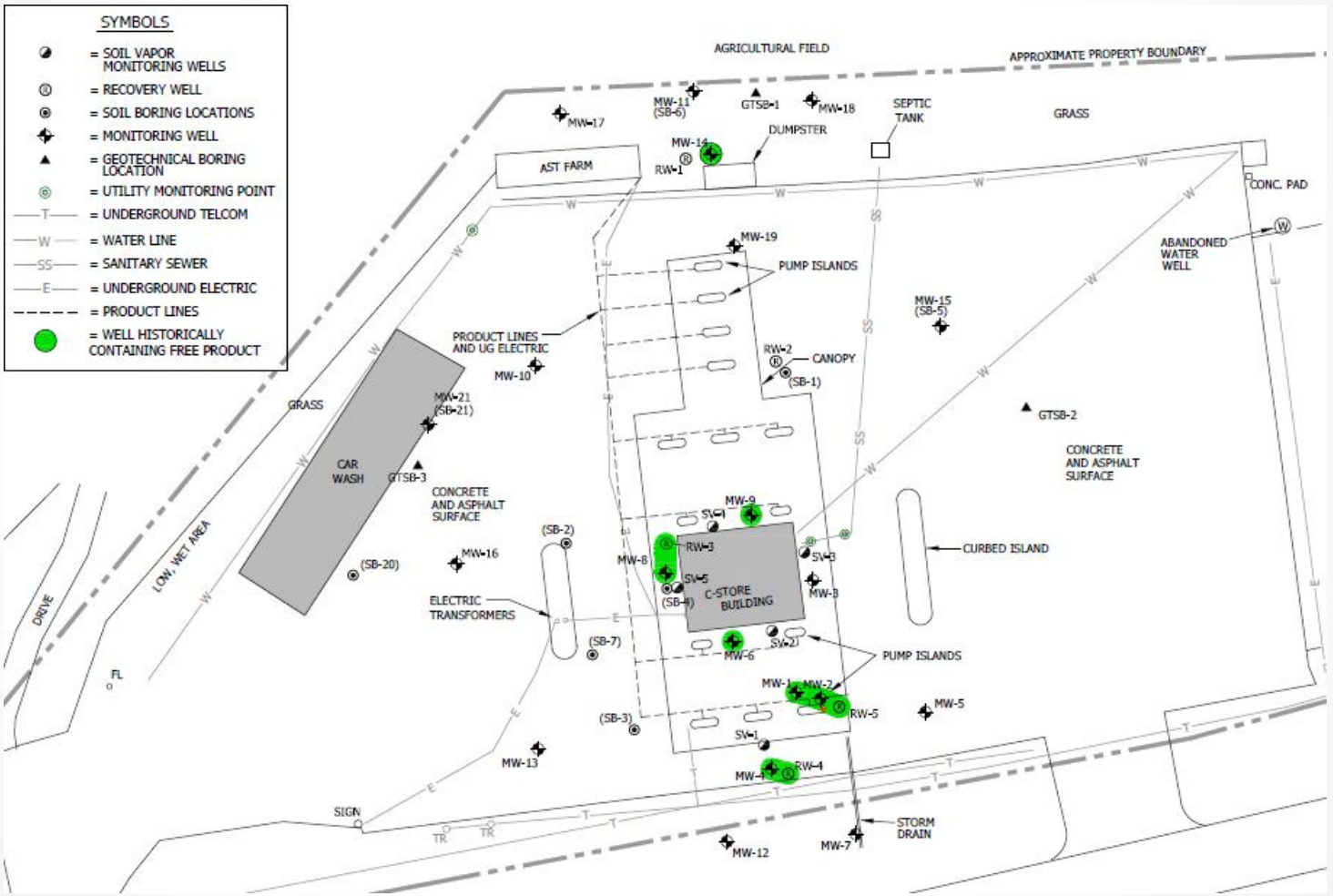

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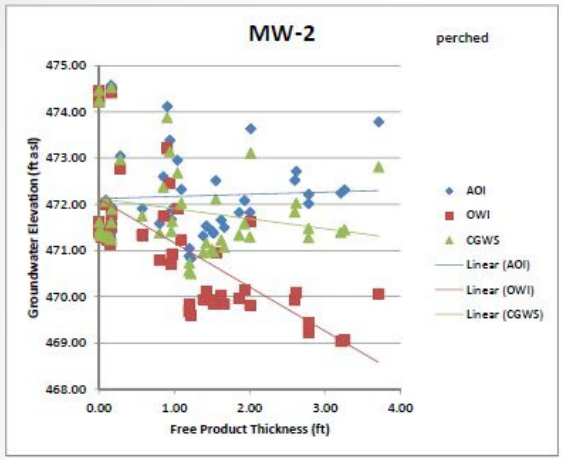

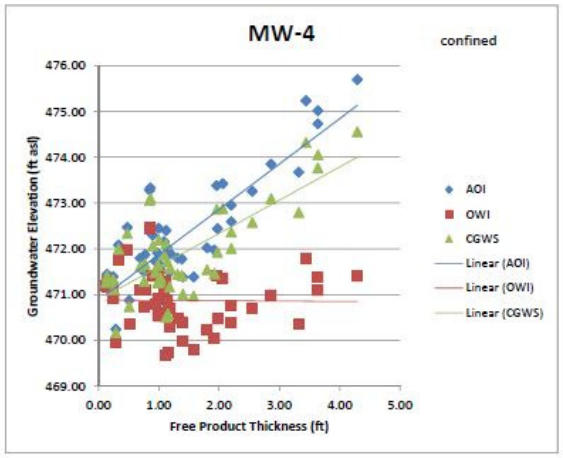

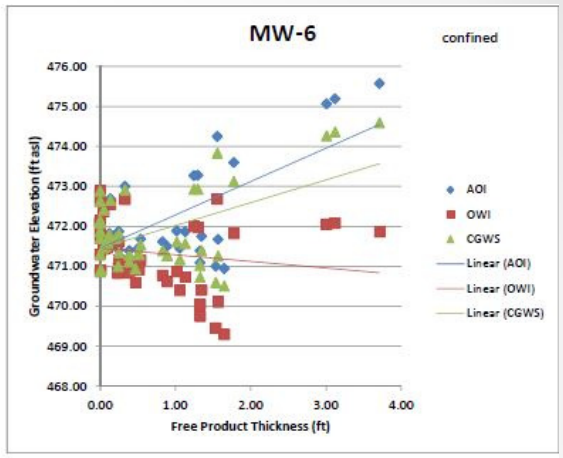

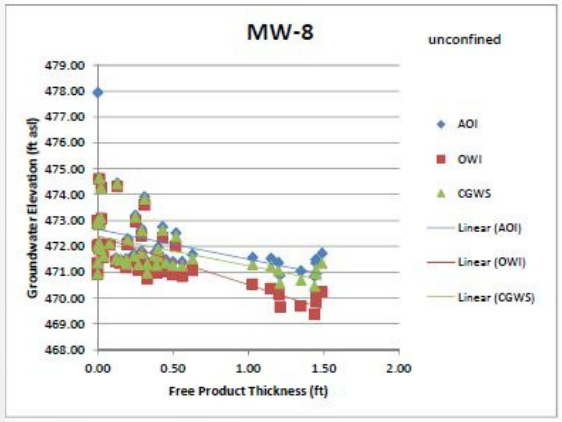

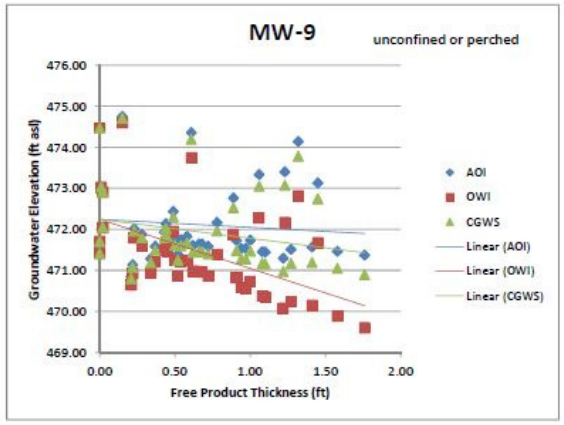

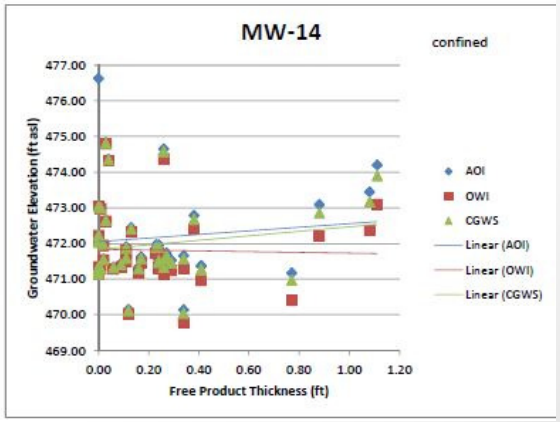

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Case Study

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Case Study

- LCSM Summary
  - Lithology is silty clay/loam that grades vertically to sand
  - Groundwater is present at 3-7 ft bls, which results in confining conditions for a majority of the time
  - Two documented gasoline releases
  - LNAPL mass is primarily present at 5-8 ft bls
  - Some mobile LNAPL is present, but not migrating
  - No risk from LNAPL at the site
  - LNAPL recovery efforts resulted in recovering approximately 200 gallons of LNAPL and nearly 5,000 gallons of impacted water

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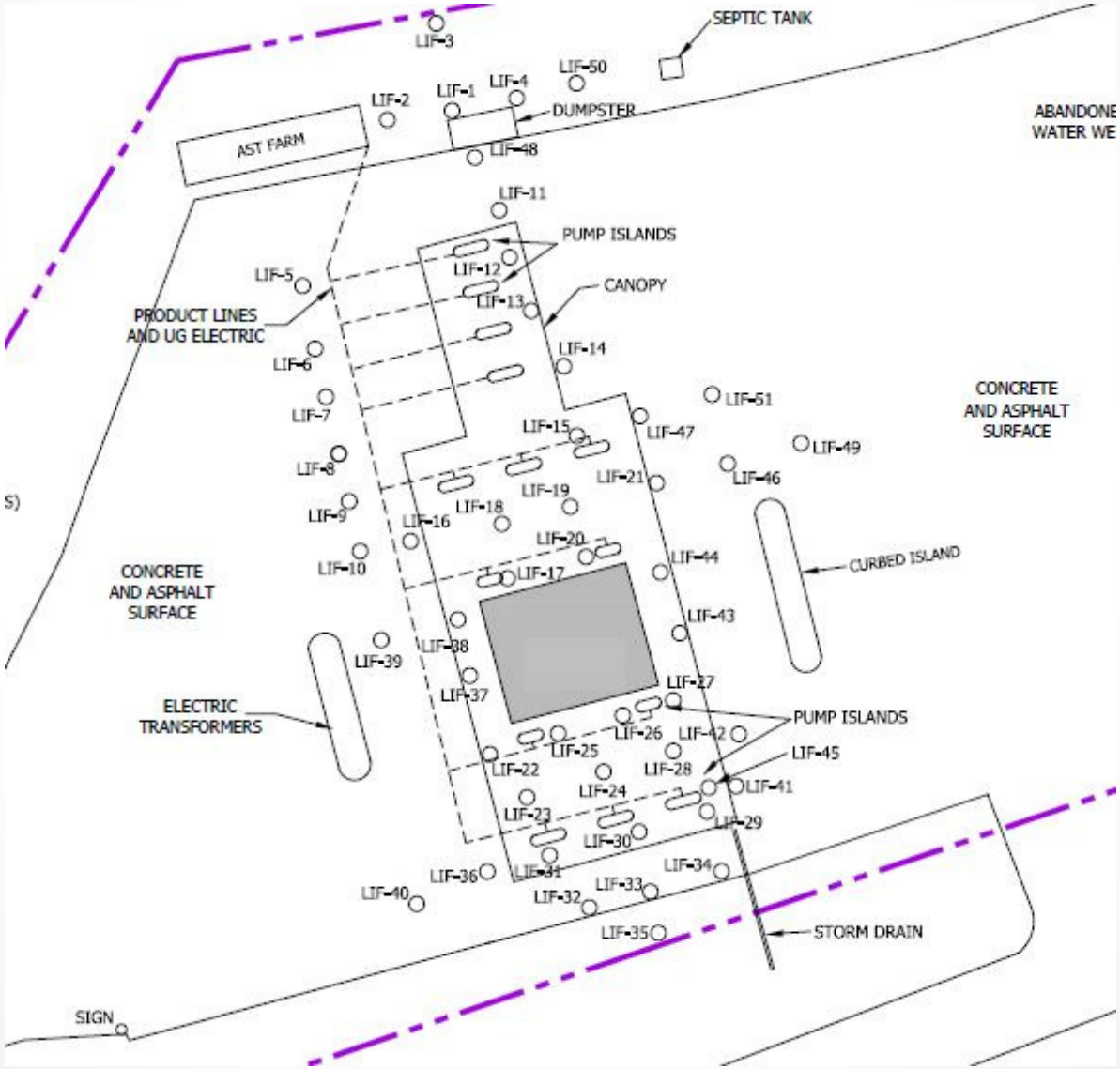
Case Study



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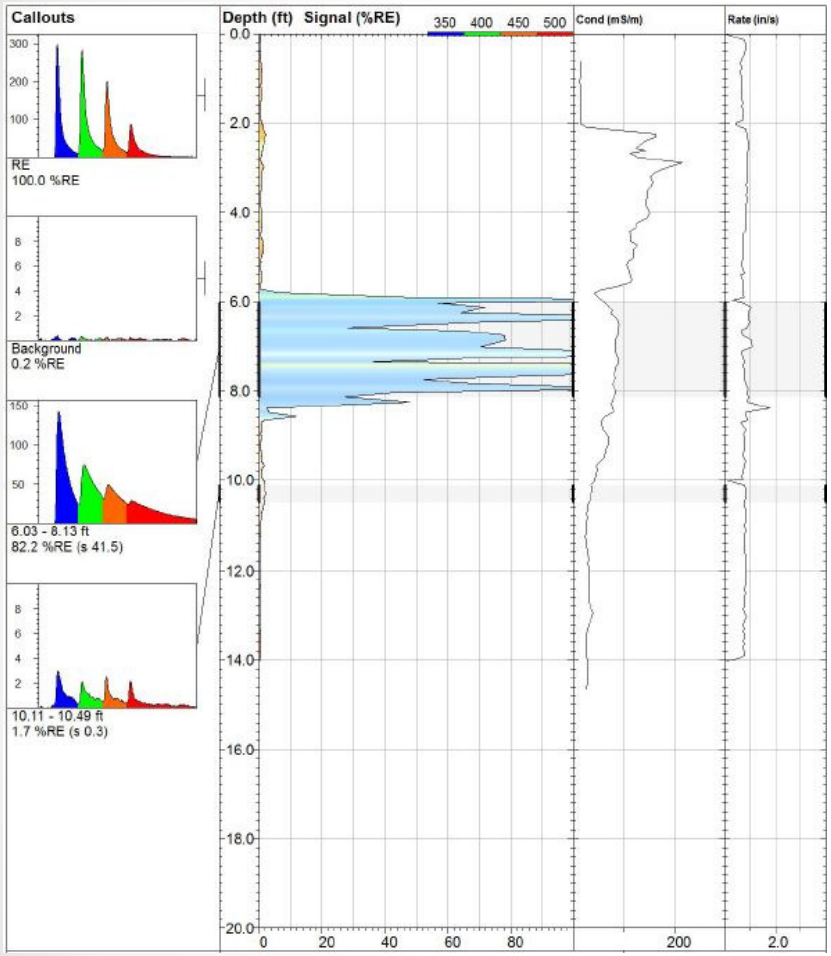

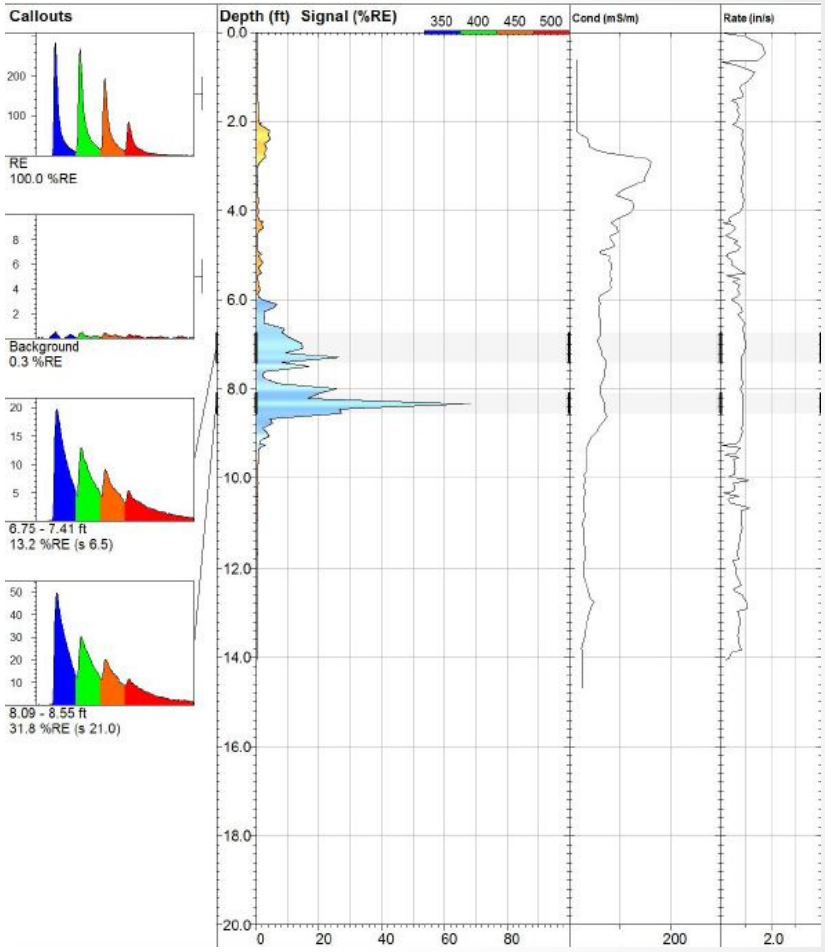

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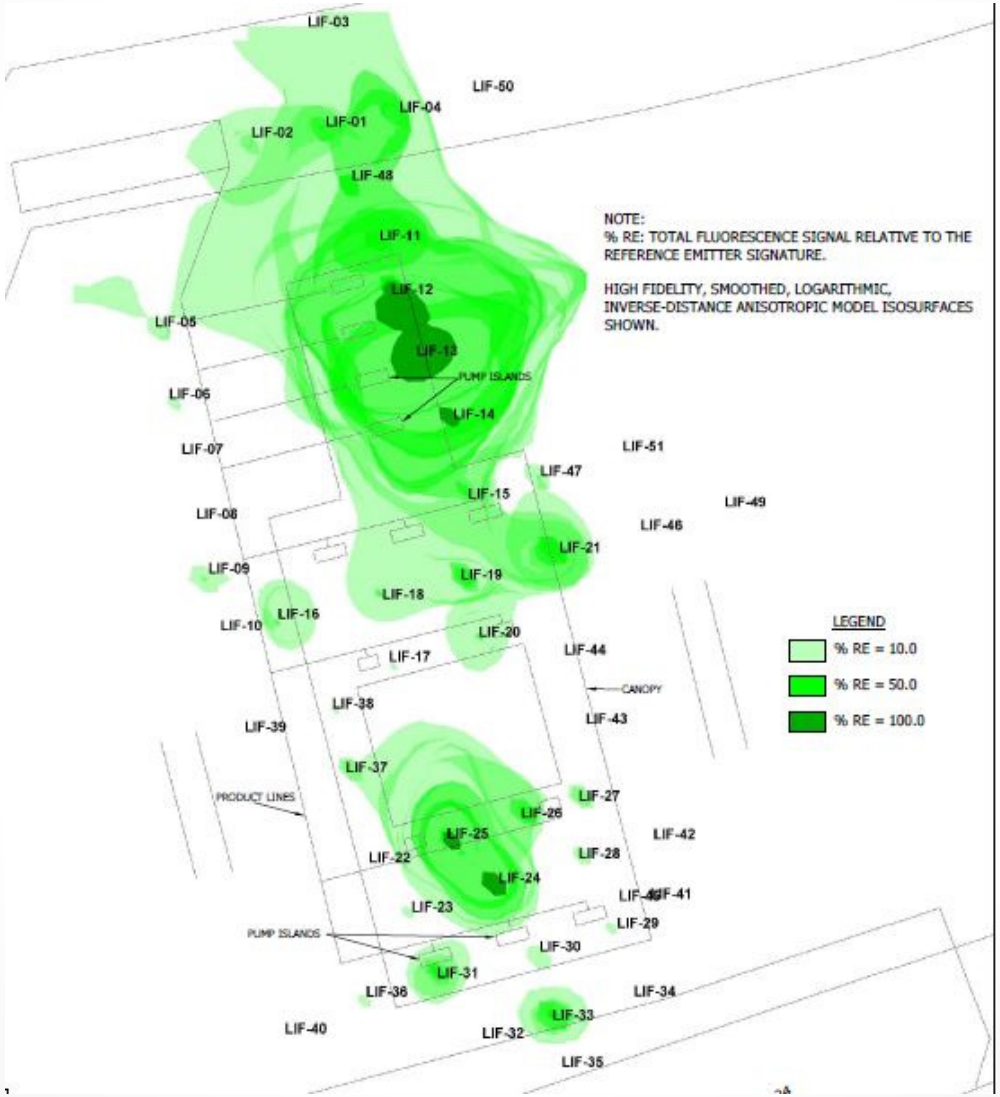

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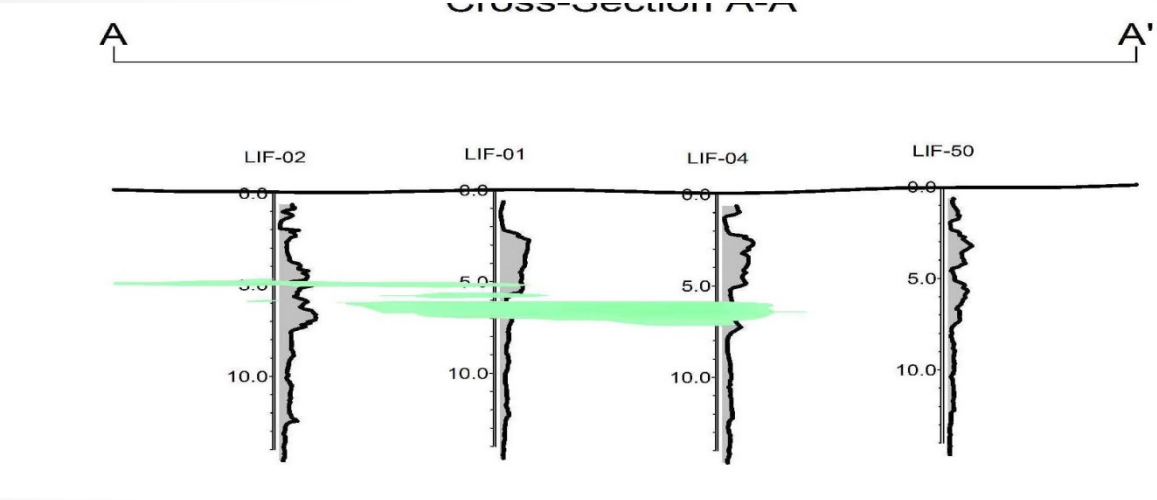

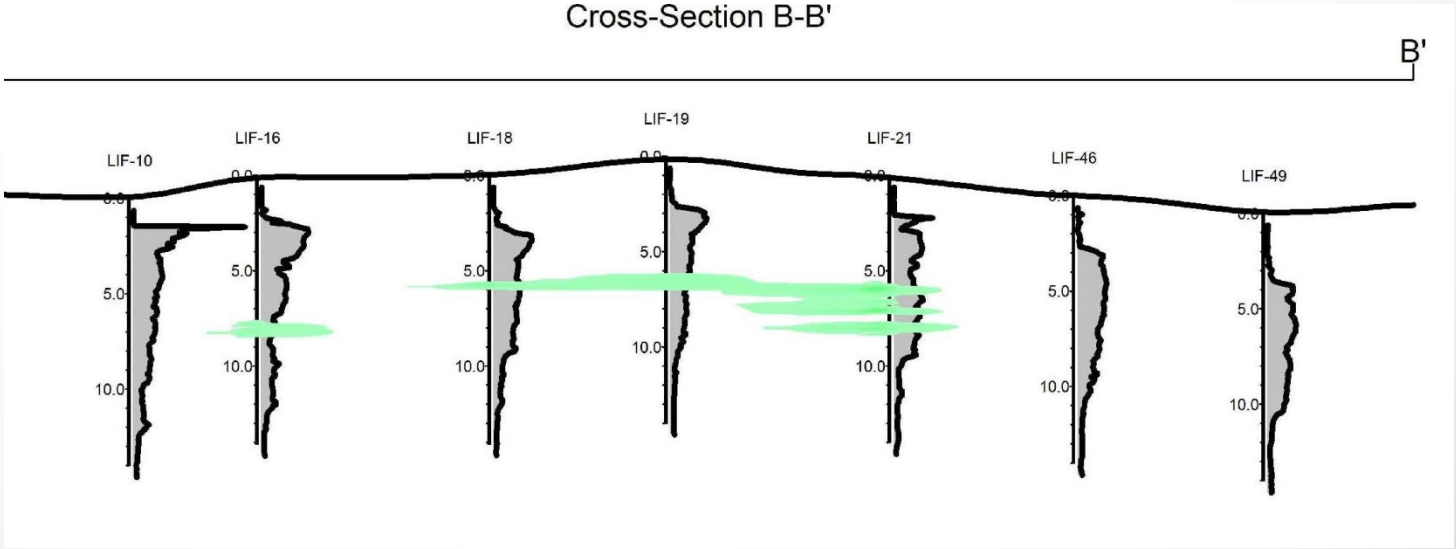

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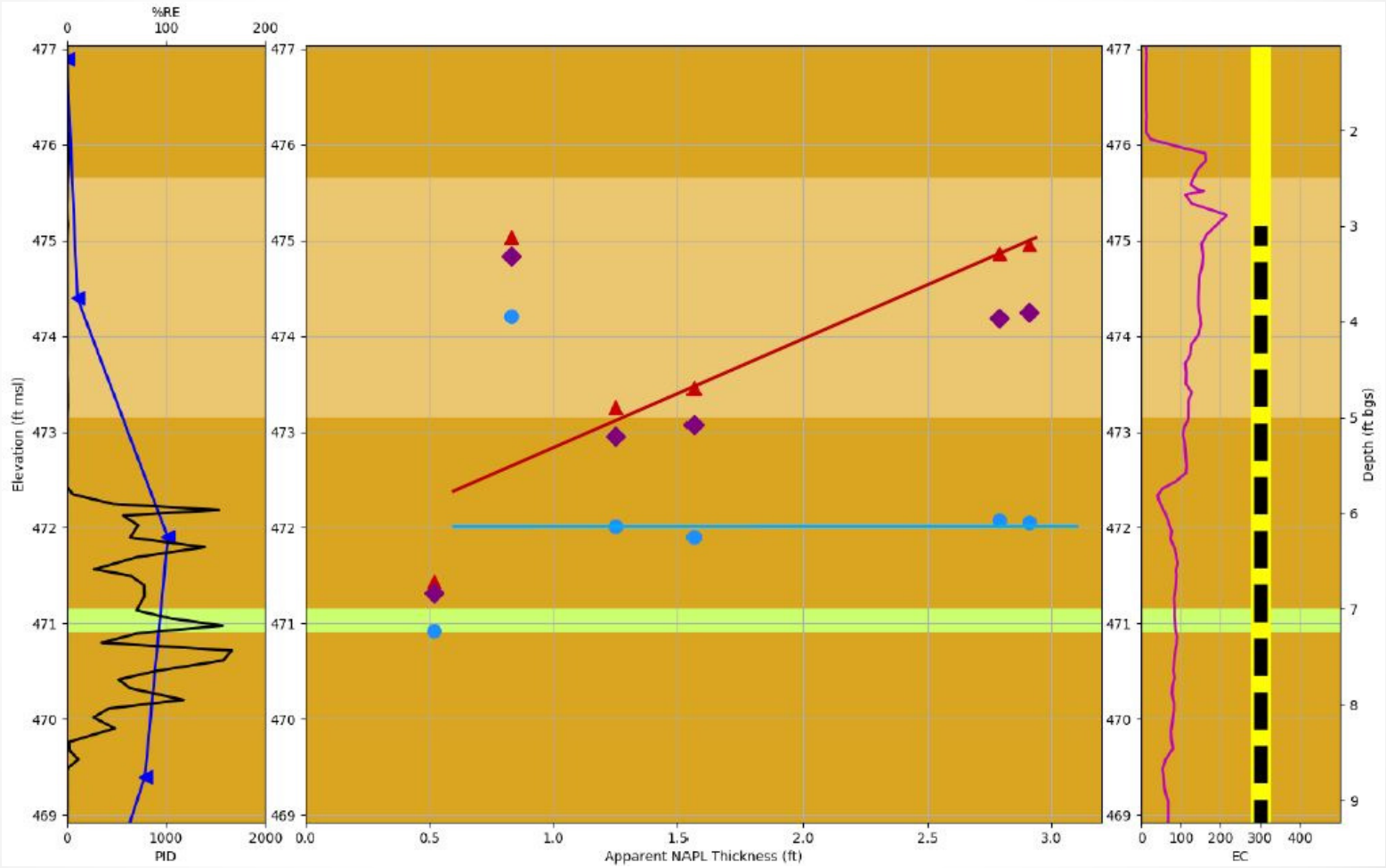

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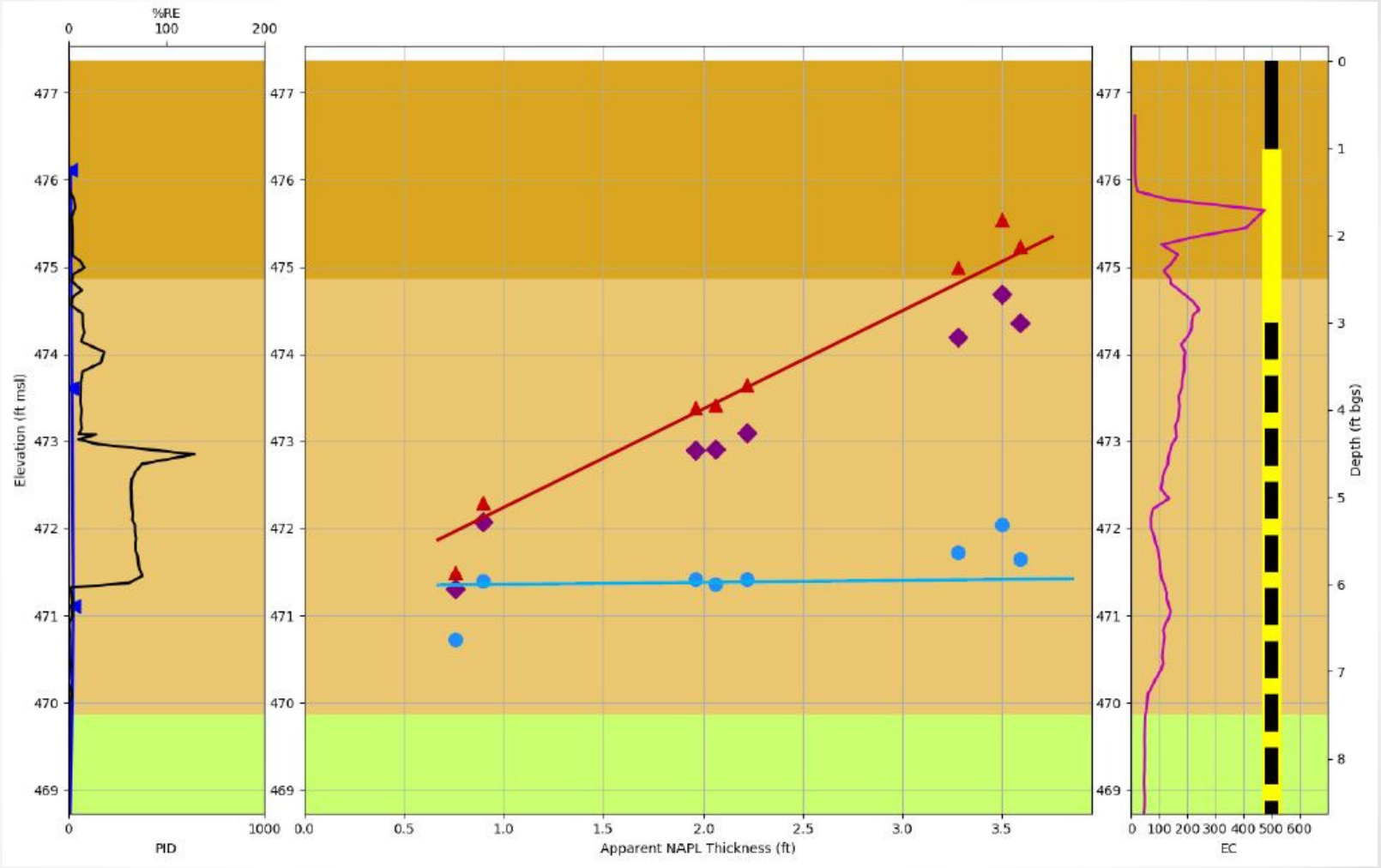

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Case Study #2 – Fuel Oil Site

- Power Plant near Kansas City
- Fuel discovered in onsite pond – old French drain 25 ft bgs
- Limited excavation, line cleaning, and camera could not identify source
- Large volume of underground pipelines and utilities

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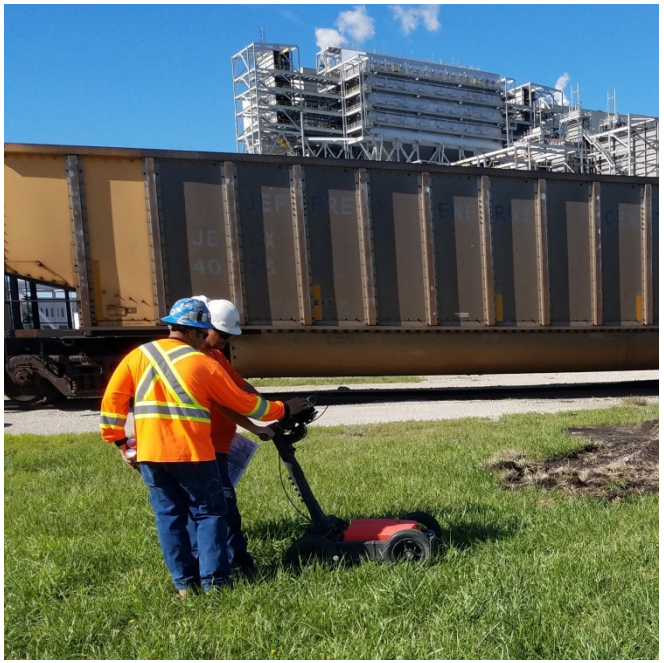
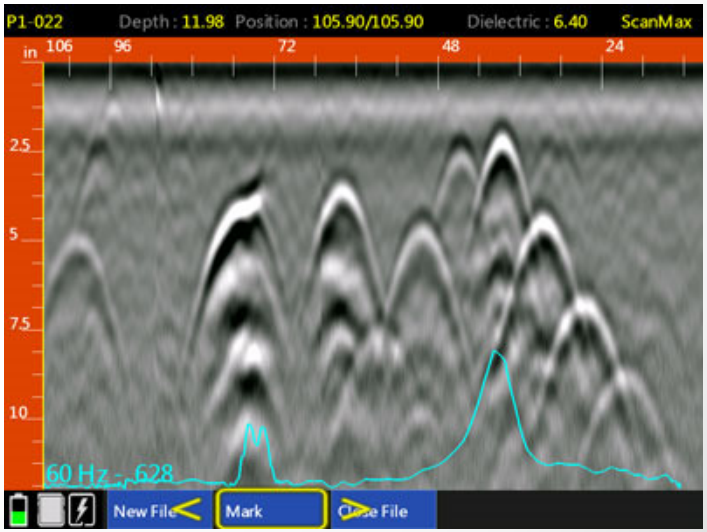
Case Study - OIP

- EWI used in-house GPR with Line Trac to locate product lines and depths
- Advanced OIP along the possible leaking lines





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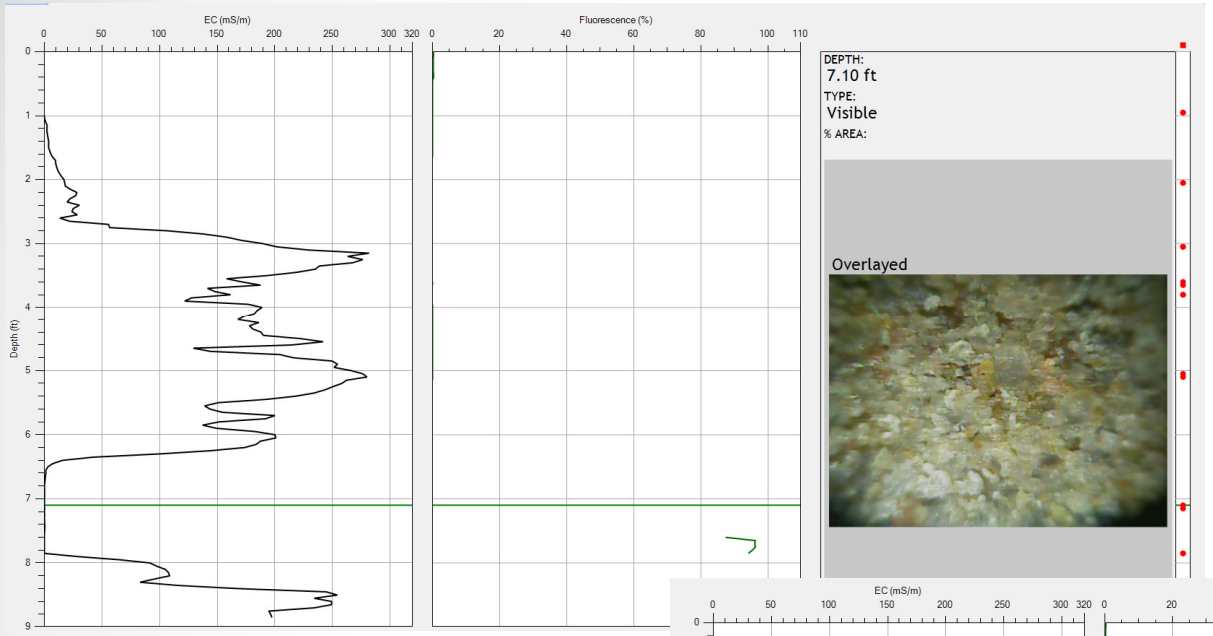
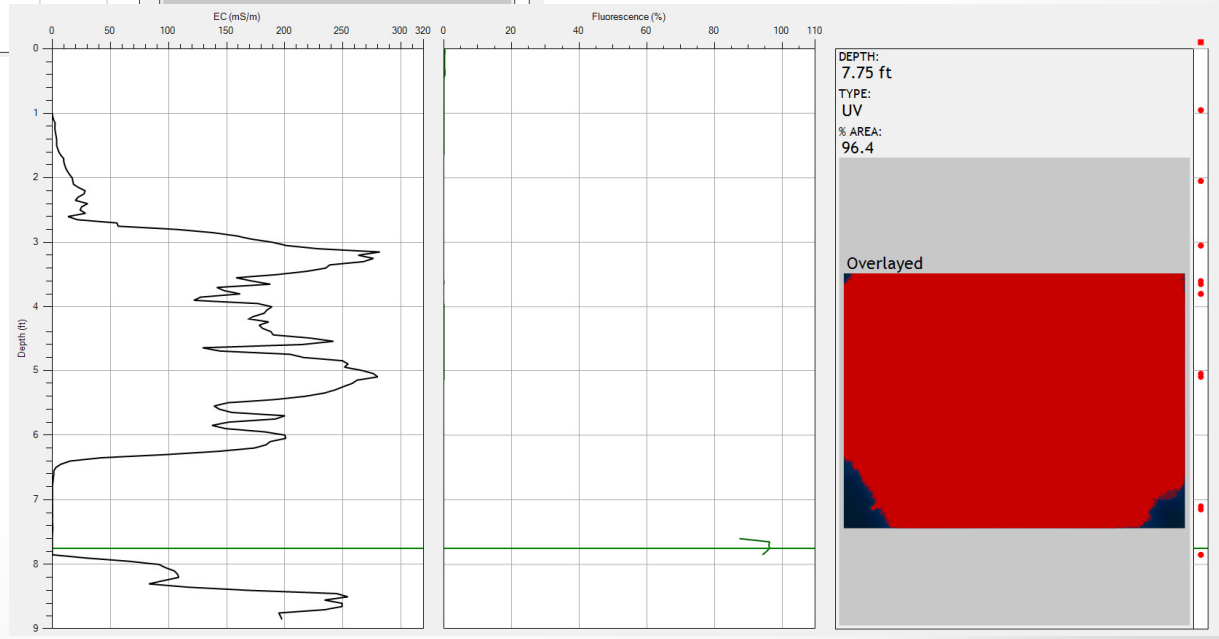


Same boring, different depths

- Optical shows clean sandy fill @ 7.2 ft bgs
- Fluorescence at 7.8 ft bgs



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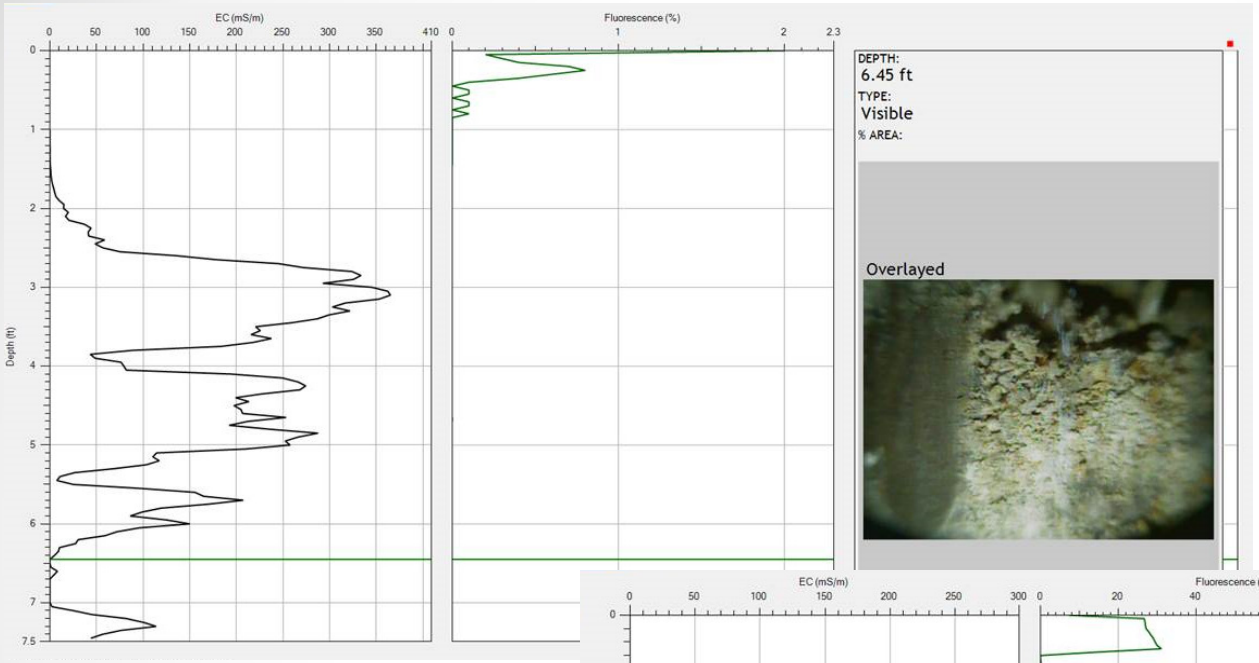
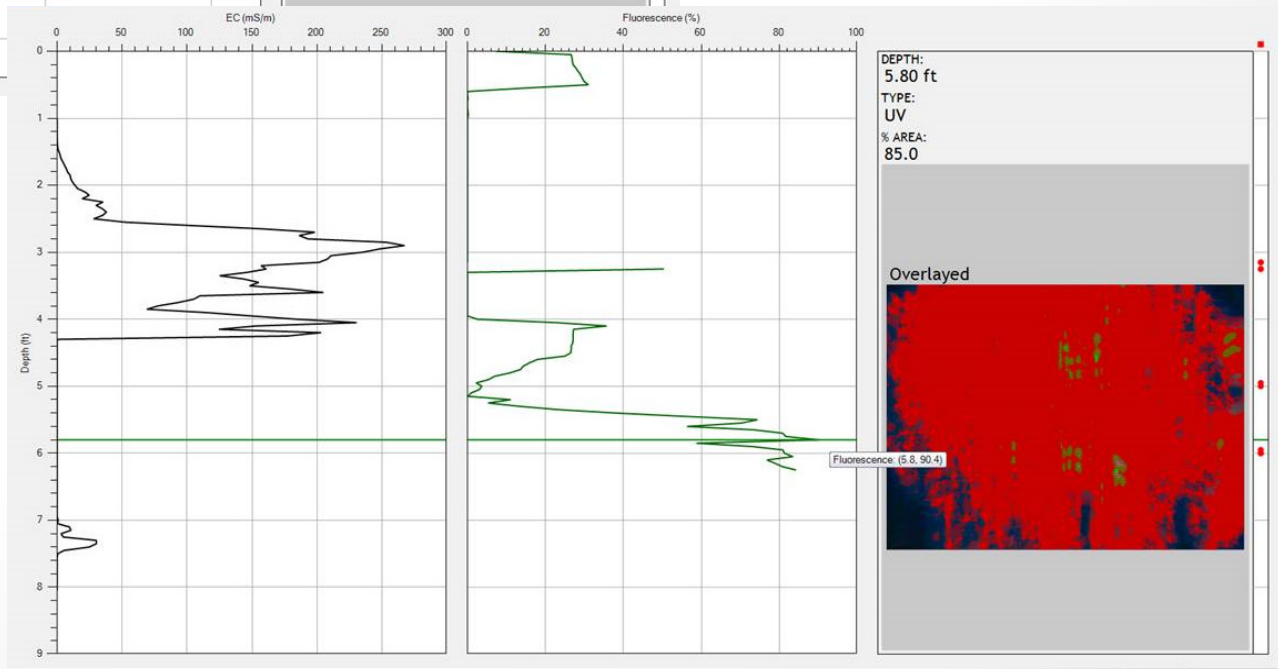
Case Study - OIP





Separate borings

- Top left shows optical when fill around product line was encountered (no LNAPL)
- Bottom shows UV fluorescence in fill material at 5.8 ft bgs

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Case Study - OIP

- EWI was able to find general source area in 1 day
- Borings advanced adjacent to OIP boreholes to collect soil samples and confirm results
- OIP borings also ID'd diesel fuel in the soils along a water line corridor

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Summary

- LNAPL fluorescence logging is a proven technology with years of experience
- Help understand LNAPL distribution in real-time
- Get quick snapshot of soil lithology with EC sensor
- Help target soil sampling horizons
- Important part of LCSM
- Direct remedial design and approach
- Can be very cost effective tool in project lifecycle
- EWI can implement with OIP and Geoprobe equipment

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Questions?

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