
Application of High Resolution Site Characterization Technology to Create Accurate 3-Dimensional Site Model and Accelerate CSM Understanding and Remedial Alternatives Evaluation

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Brief Background

- A release of hydraulic oil was discovered at a manufacturing facility in western Pennsylvania, including the identification of light non-aqueous phase liquid (LNAPL) across a broad area exterior to the building.
- The initial discovery indicated that additional assessment was necessary to assess the associated risk and to further advance the Conceptual Site Model (CSM). (Traditional soil samples and MWS were not adequate)

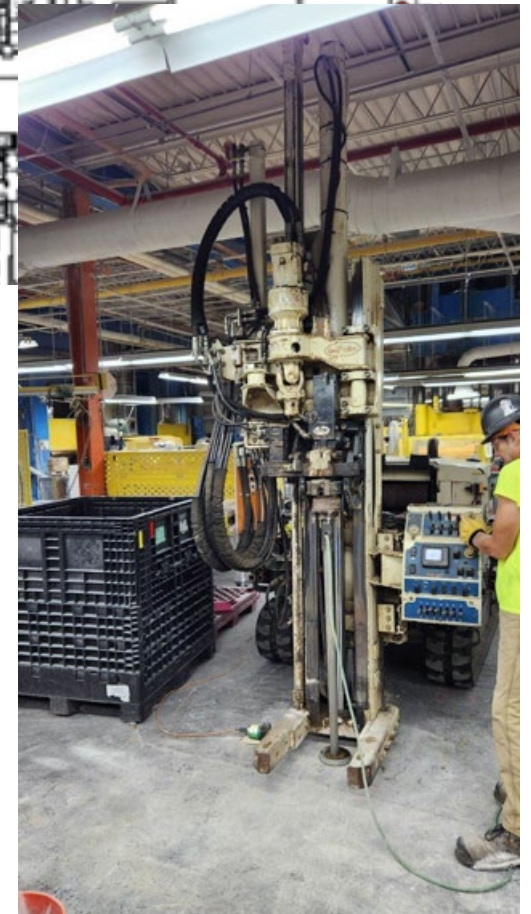
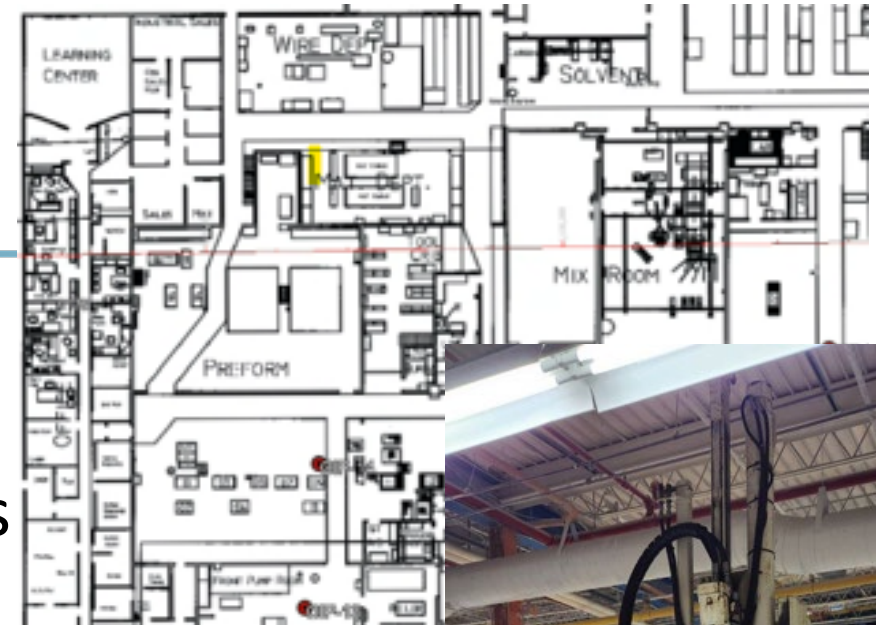


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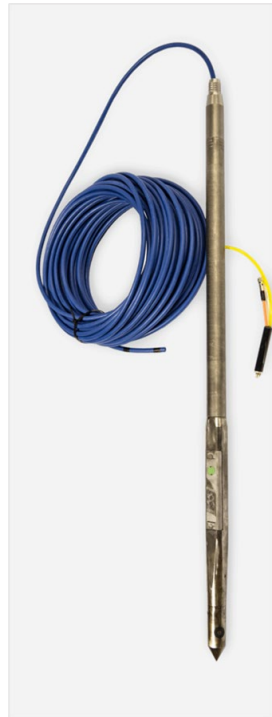
Challenges

- Logistical
 - Active Manufacturing Facility
 - Potential Outdoor/Indoor Investigations
- CSM & COCs
 - Working Dynamically Hinderances
 - Hydraulic Oil/LNAPL

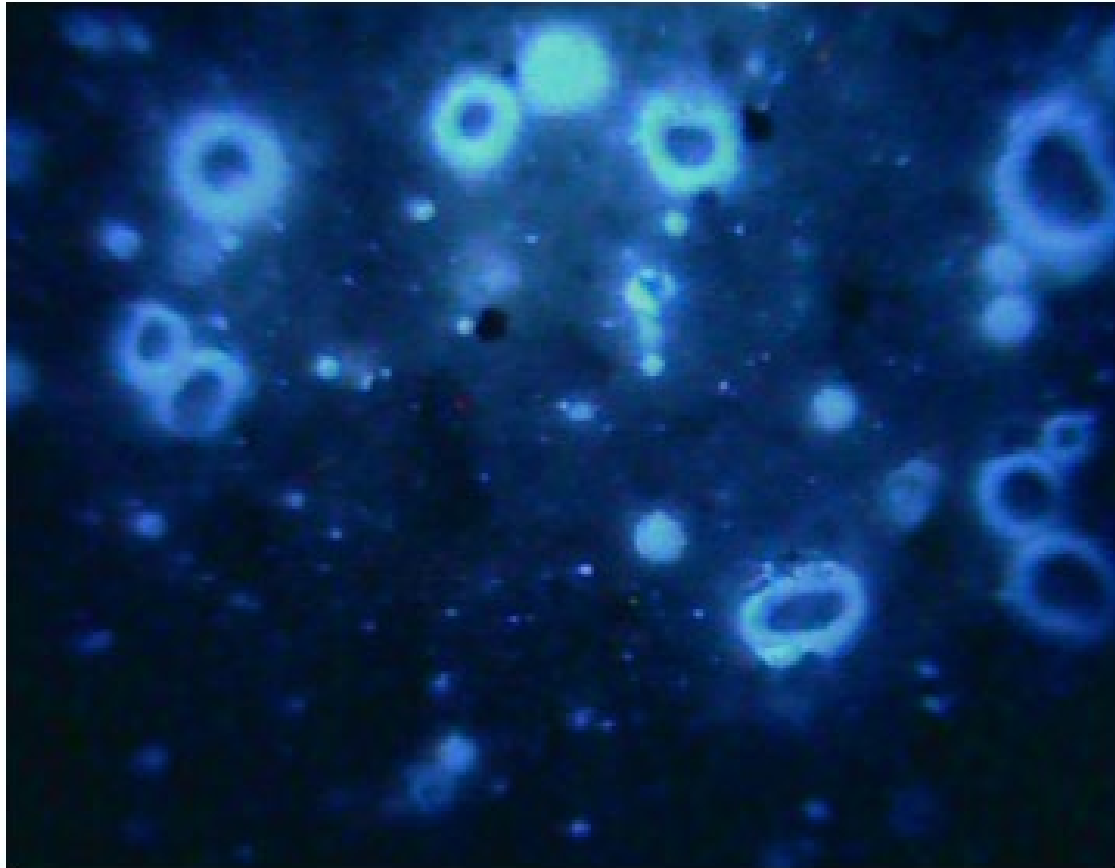


Efficient & Enhanced CSM- Goal

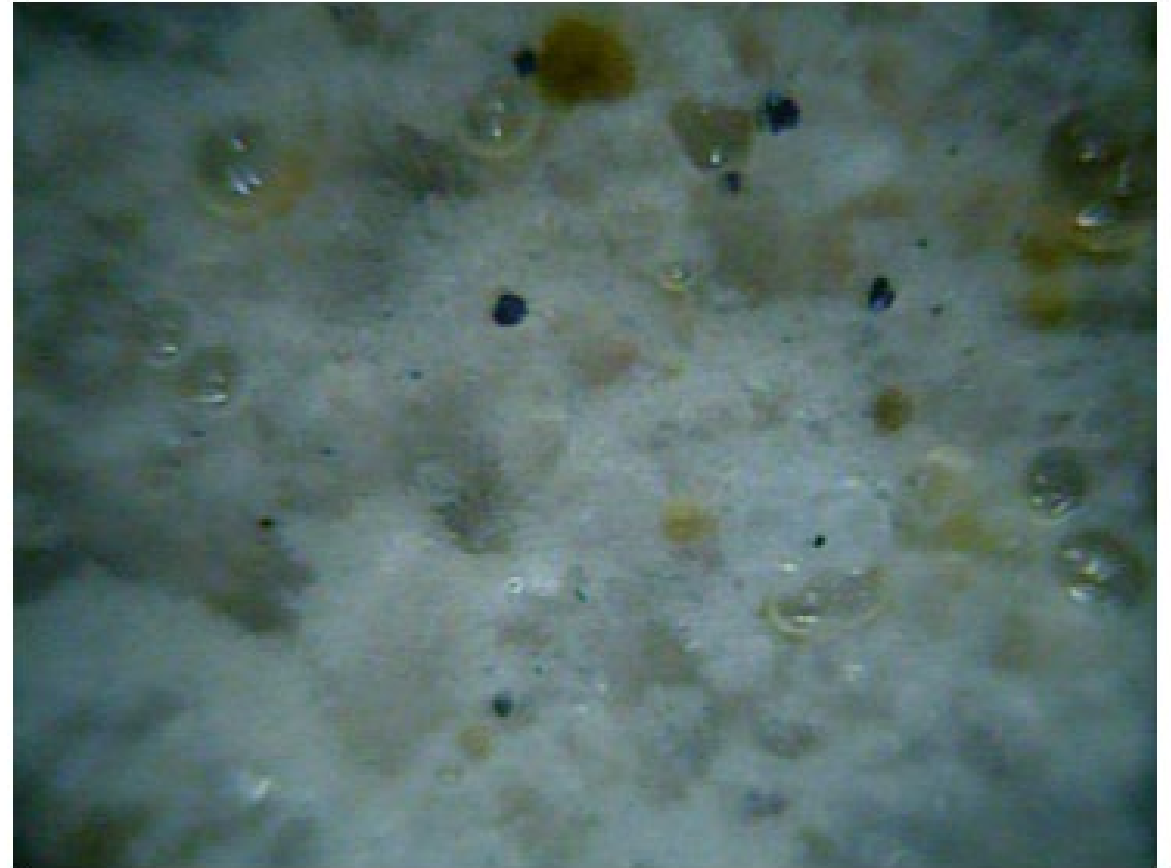
- Dynamic Approach
 - 1- 2 Mobilizations
- HRSC
 - Delineation of LNAPL
 - Laterally
 - Vertically



OIP/HPT - OIHPT – Two Light Sources



UV Light Source



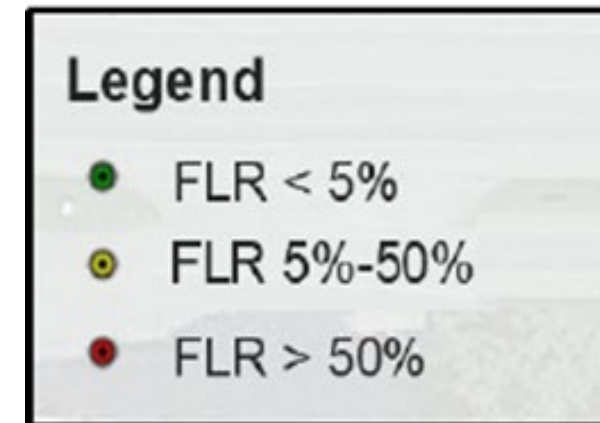
Visible Light Source

12 20

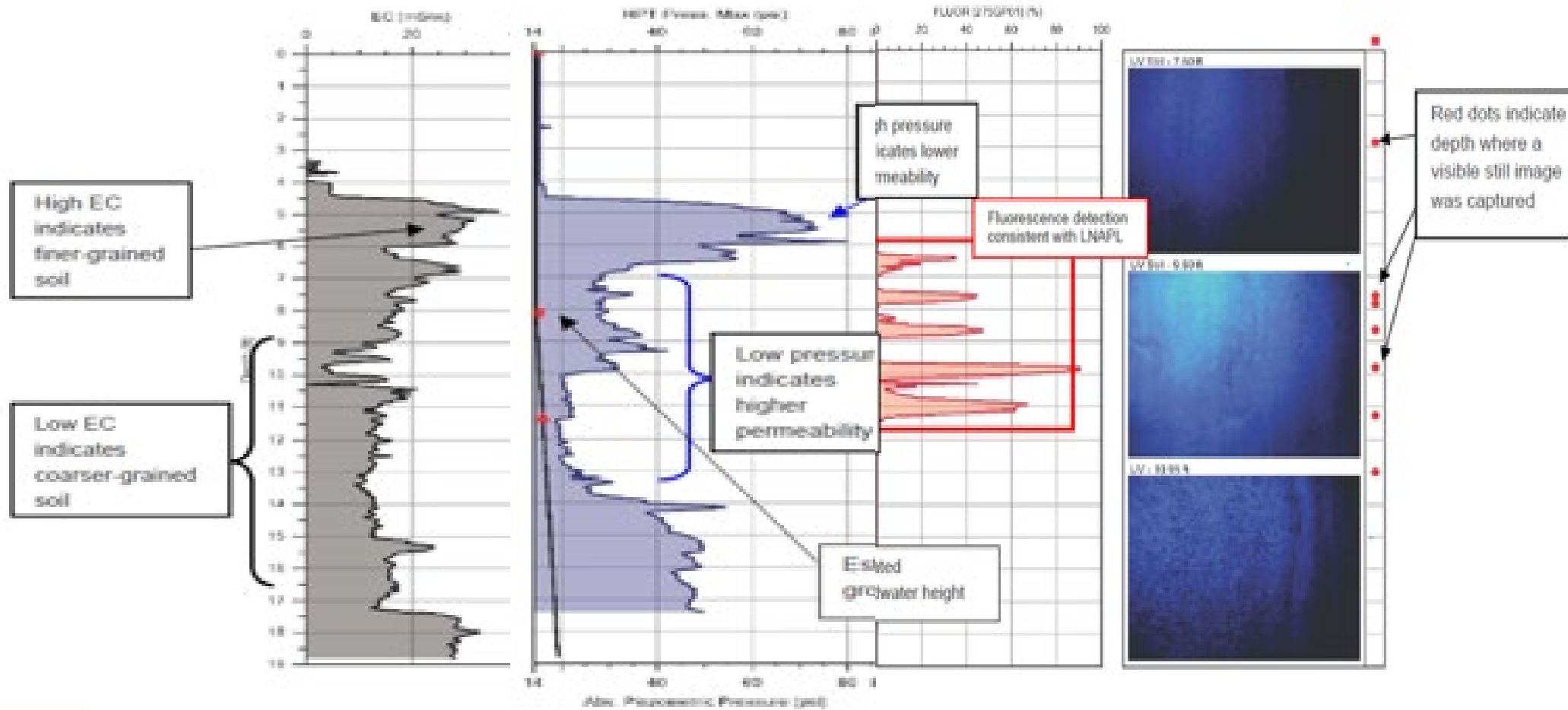
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55

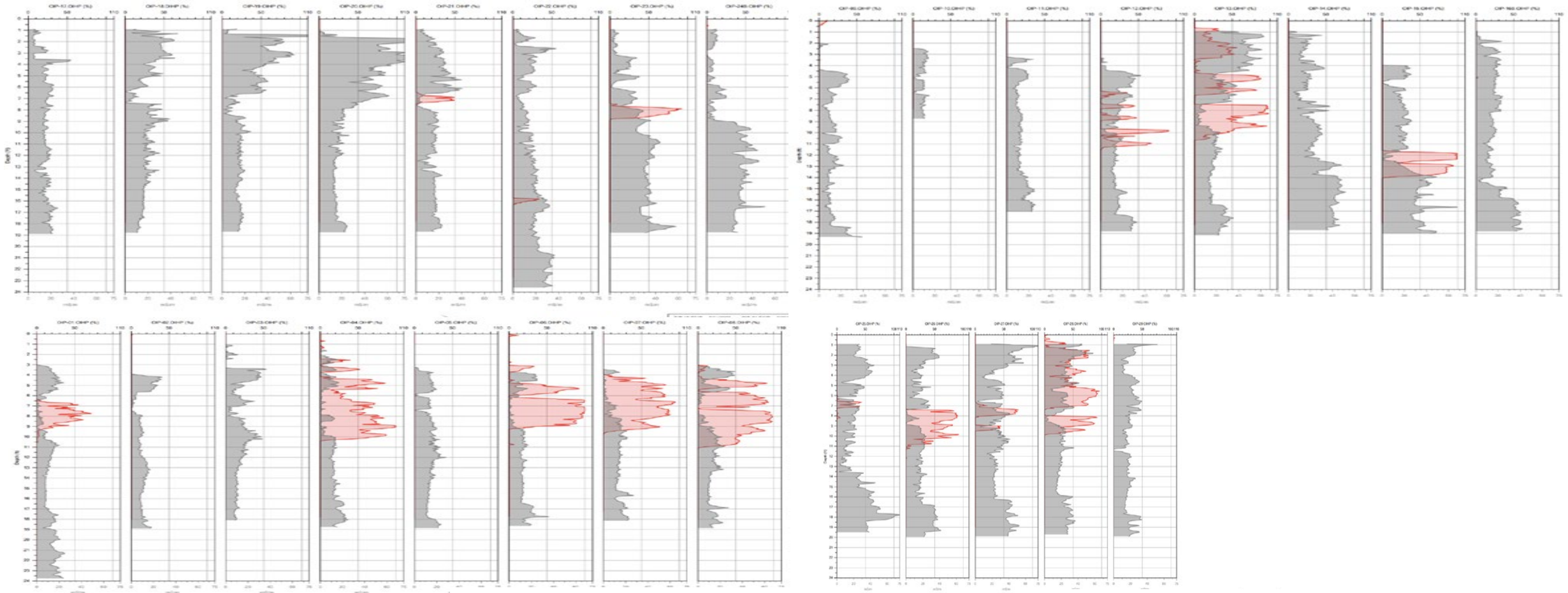
Field Map (OIP/HPT/EC Locations)



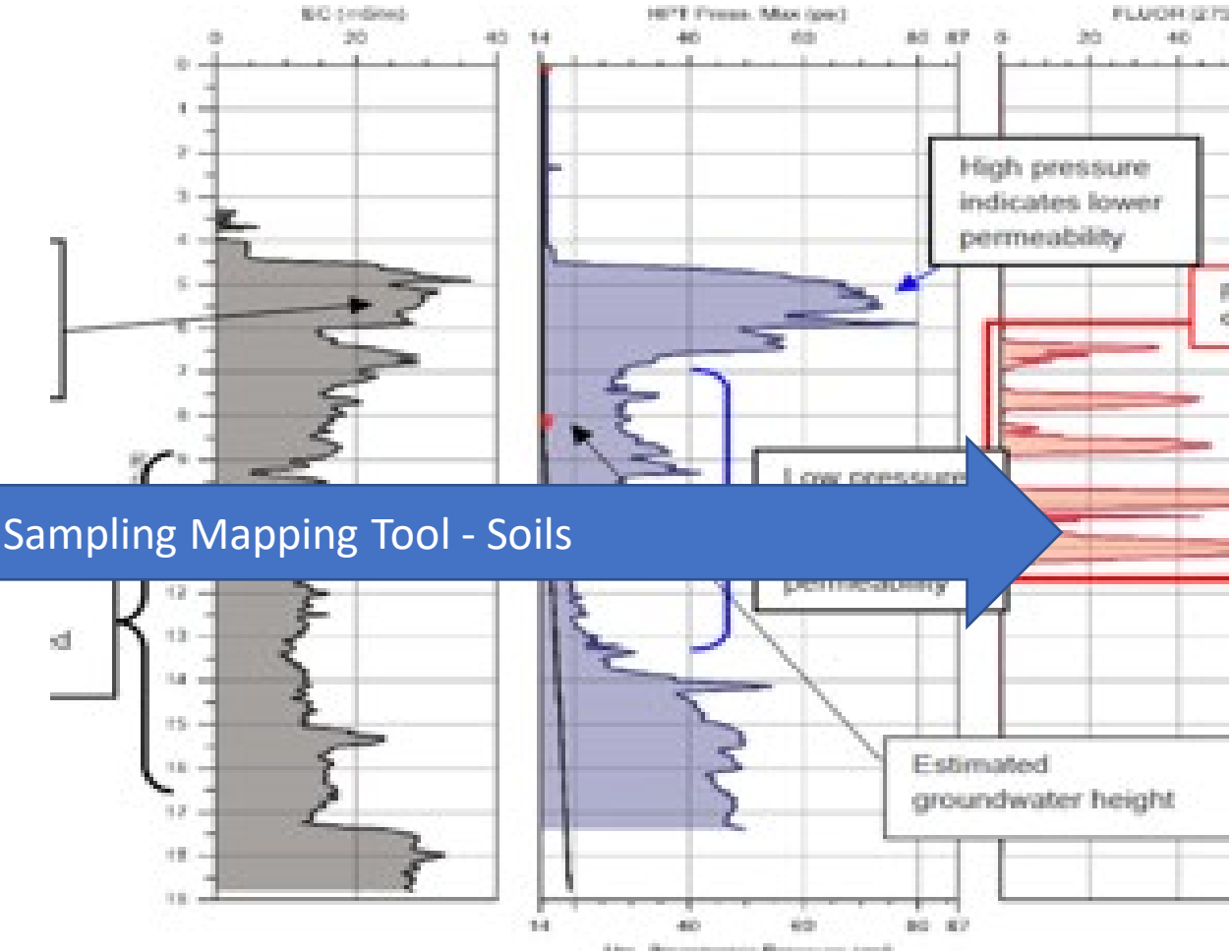
HRSC Output



Overlays (Fluorescence and Electrical Conductivity)



Targeted Sampling

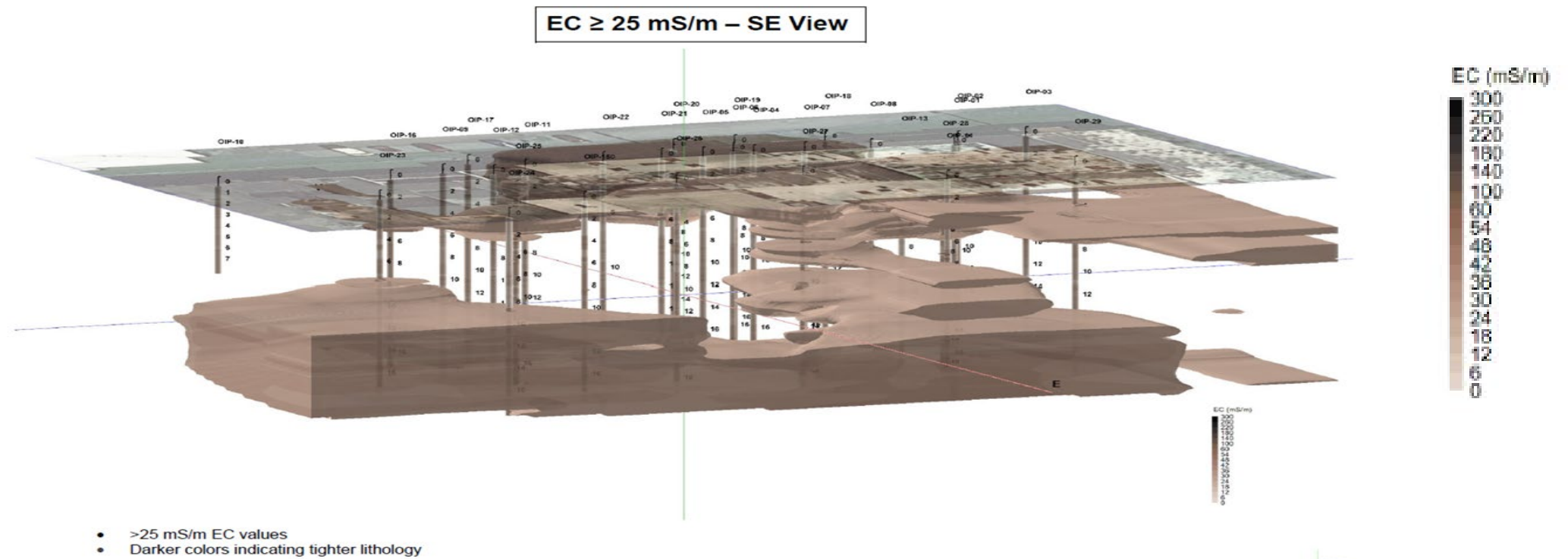


3D Modeling Visualization to Enhance Decisions

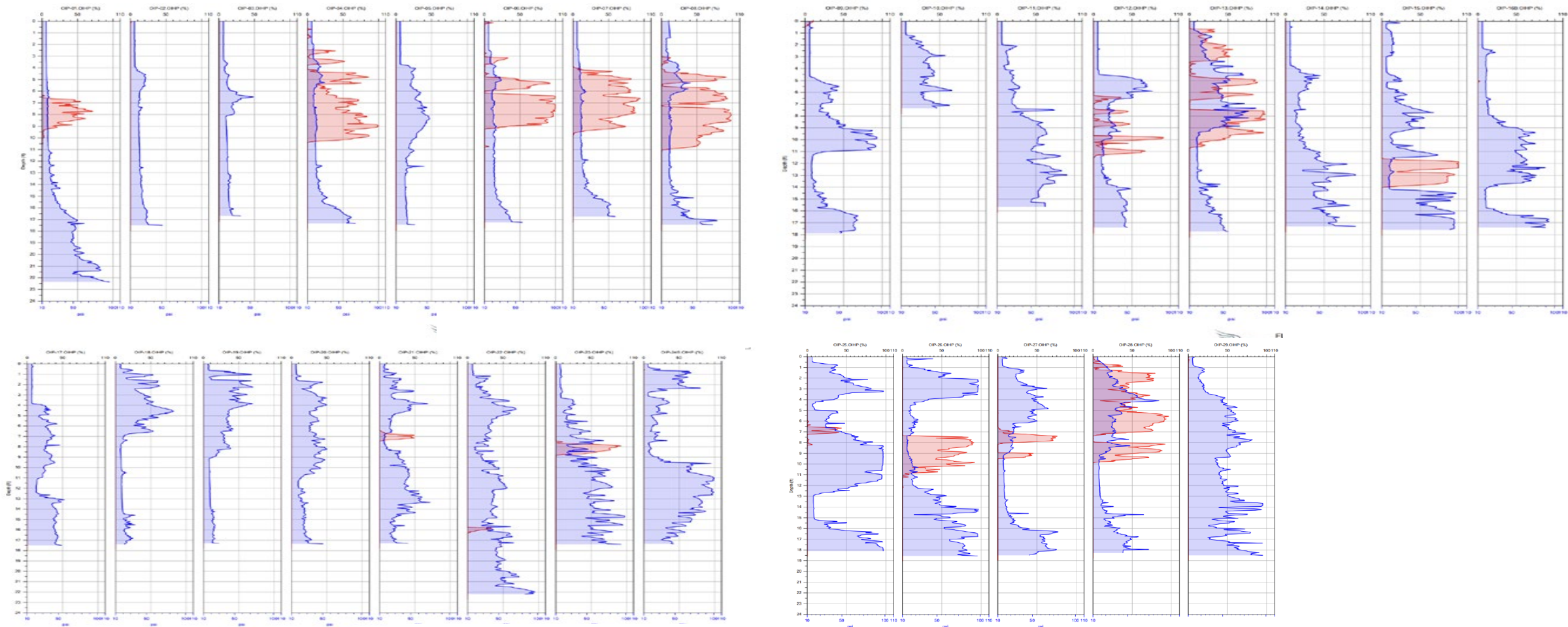
- 3D modeling combined with High Resolution Site Characterization (HRSC) data enables the visualization of subsurface contaminant distribution.
- HRSC is specifically useful in understanding contaminant distribution with multiple suspected sources since the model interpolates and integrates a large amount of data, including HRSC data, confirmation sampling, and traditional sampling.



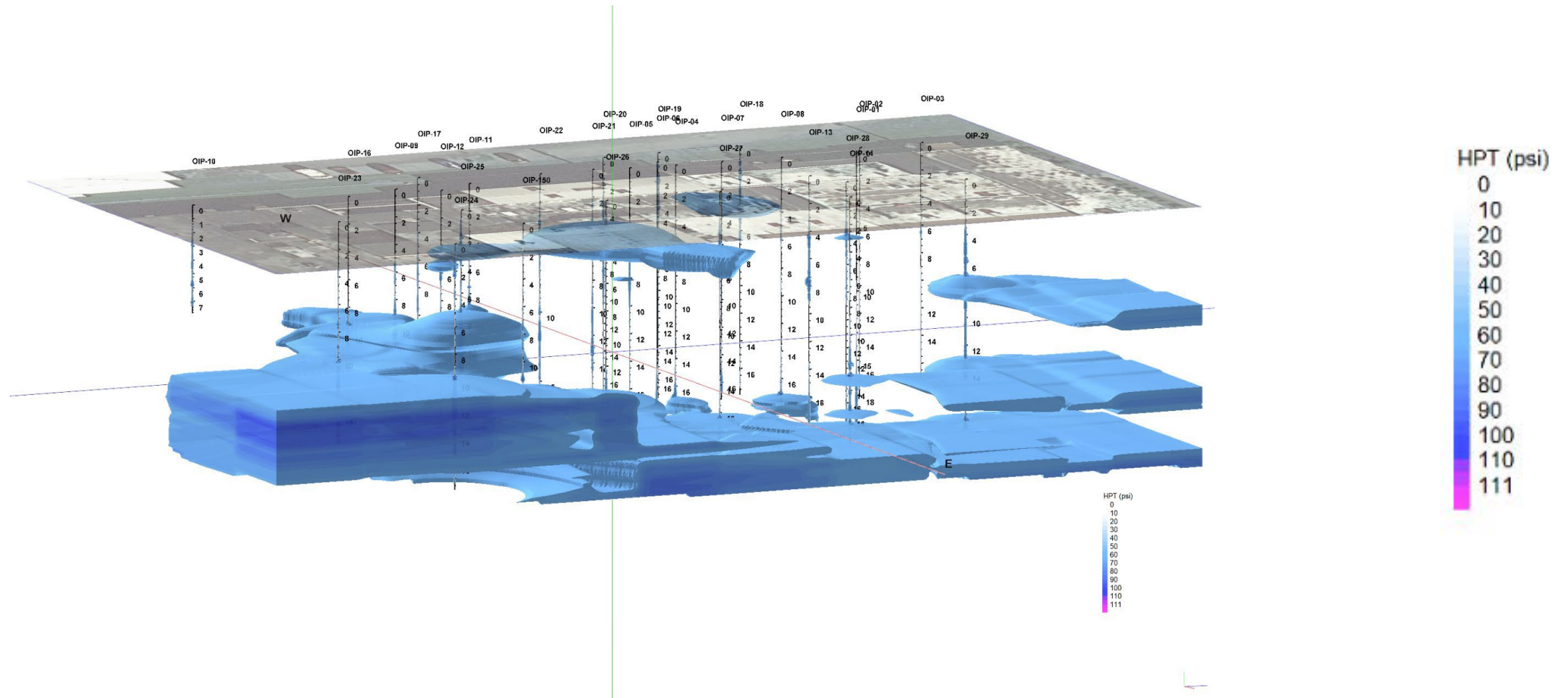
EC ≥ 25 mS/m – SE View



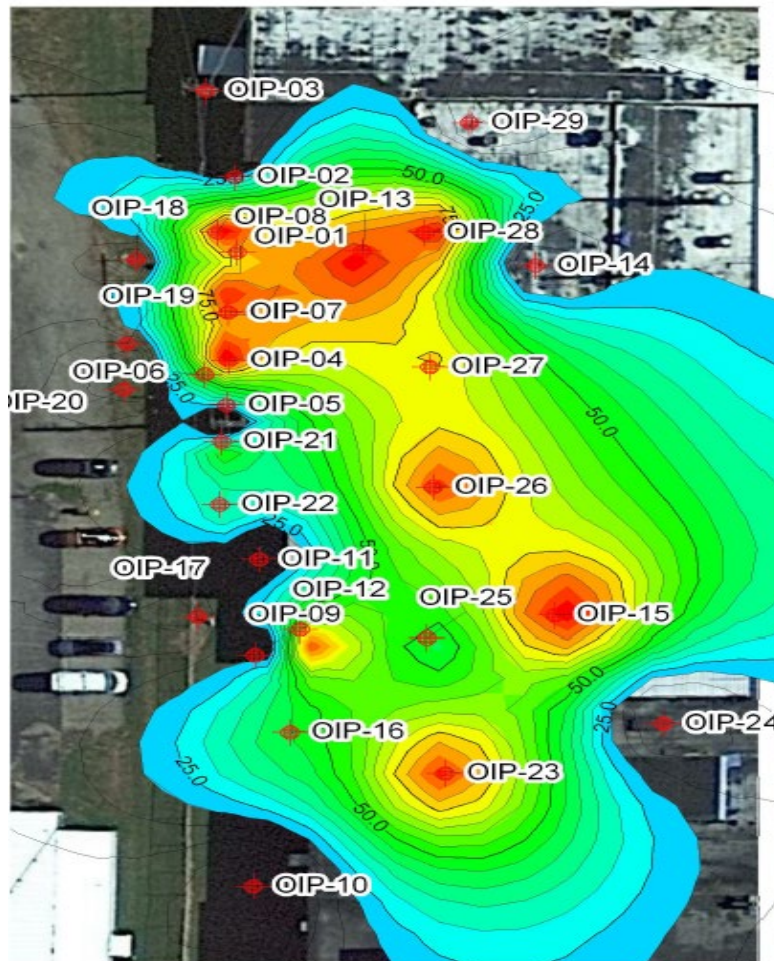
Overlays (Fluorescence and HPT)



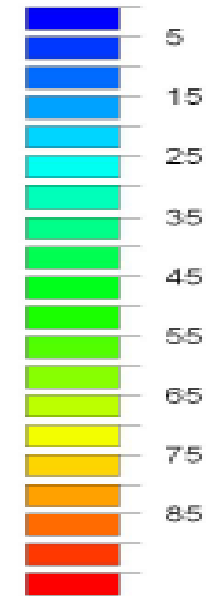
HPT Pressure ≥ 60 psi – SE View



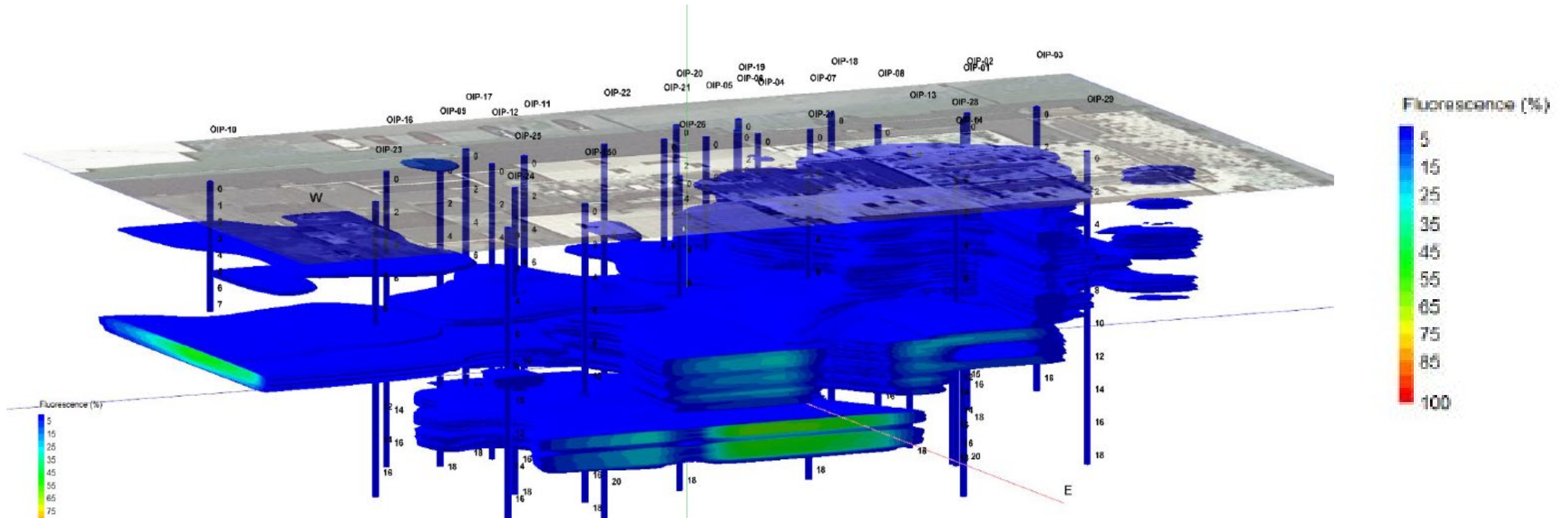
OIP – Max Fluorescence map >20%



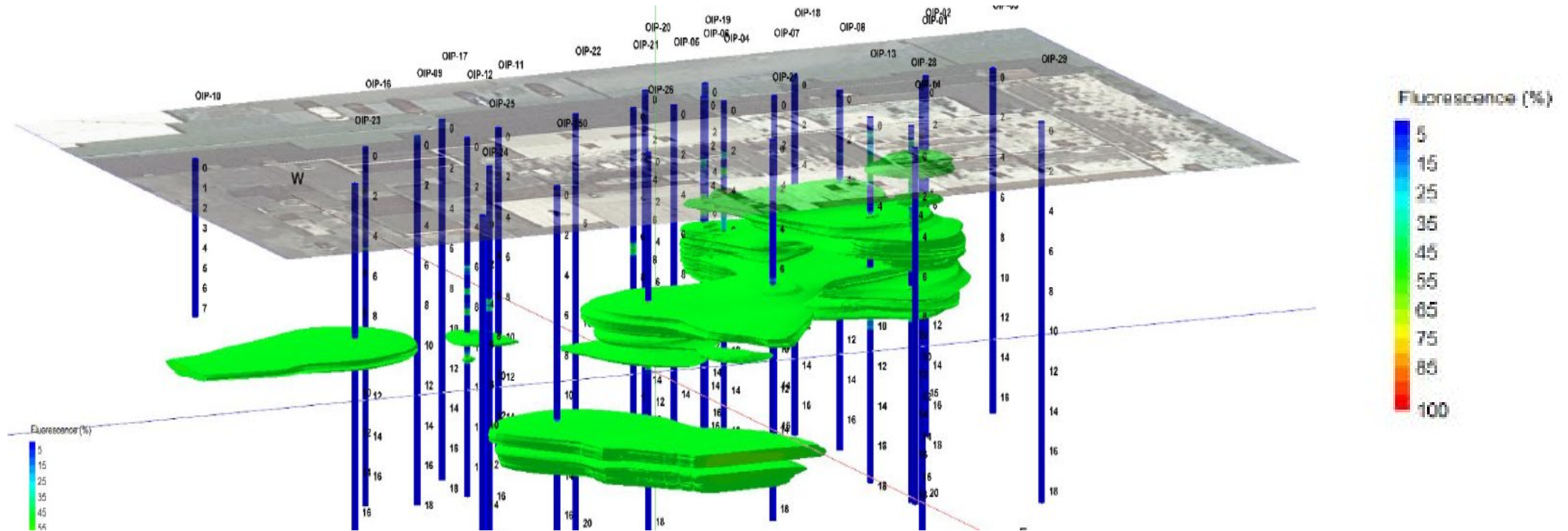
Fluorescence (%)



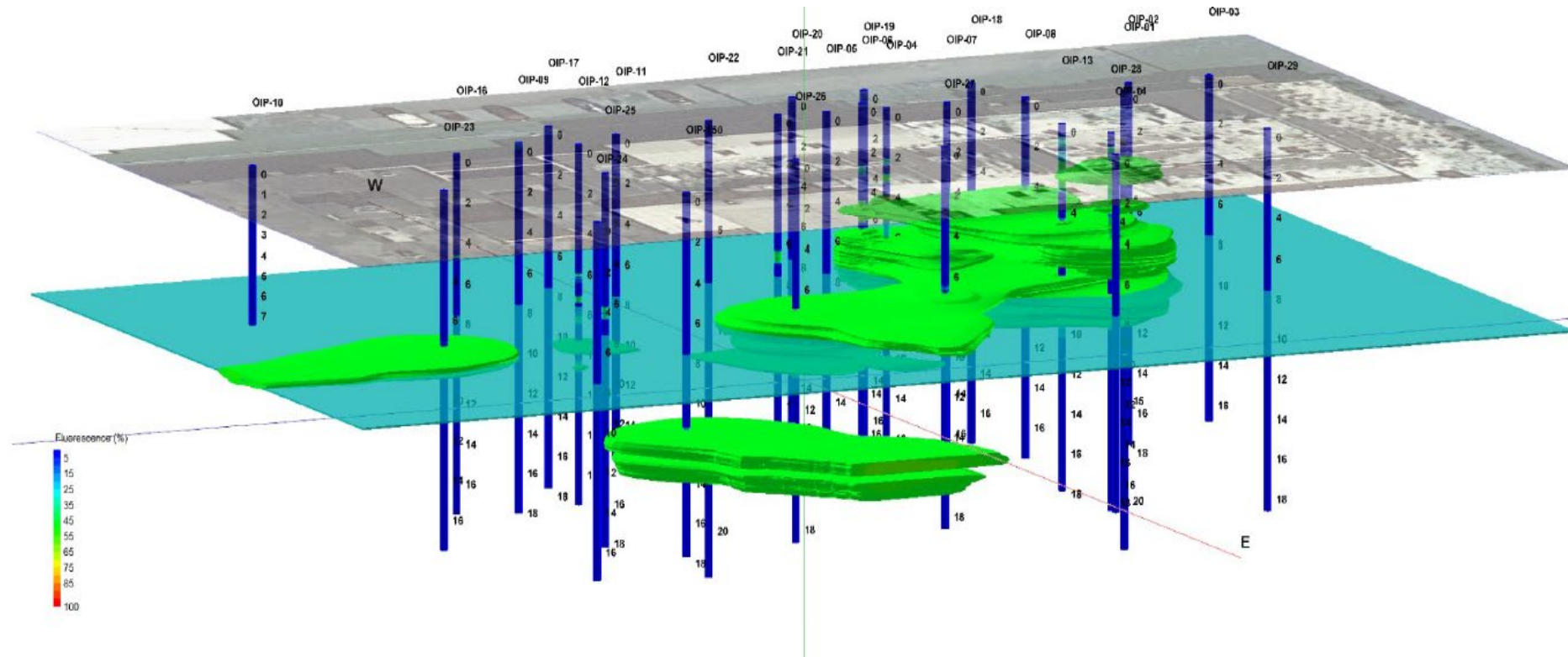
OIP Fluorescence $\geq 5\%$ - SE View



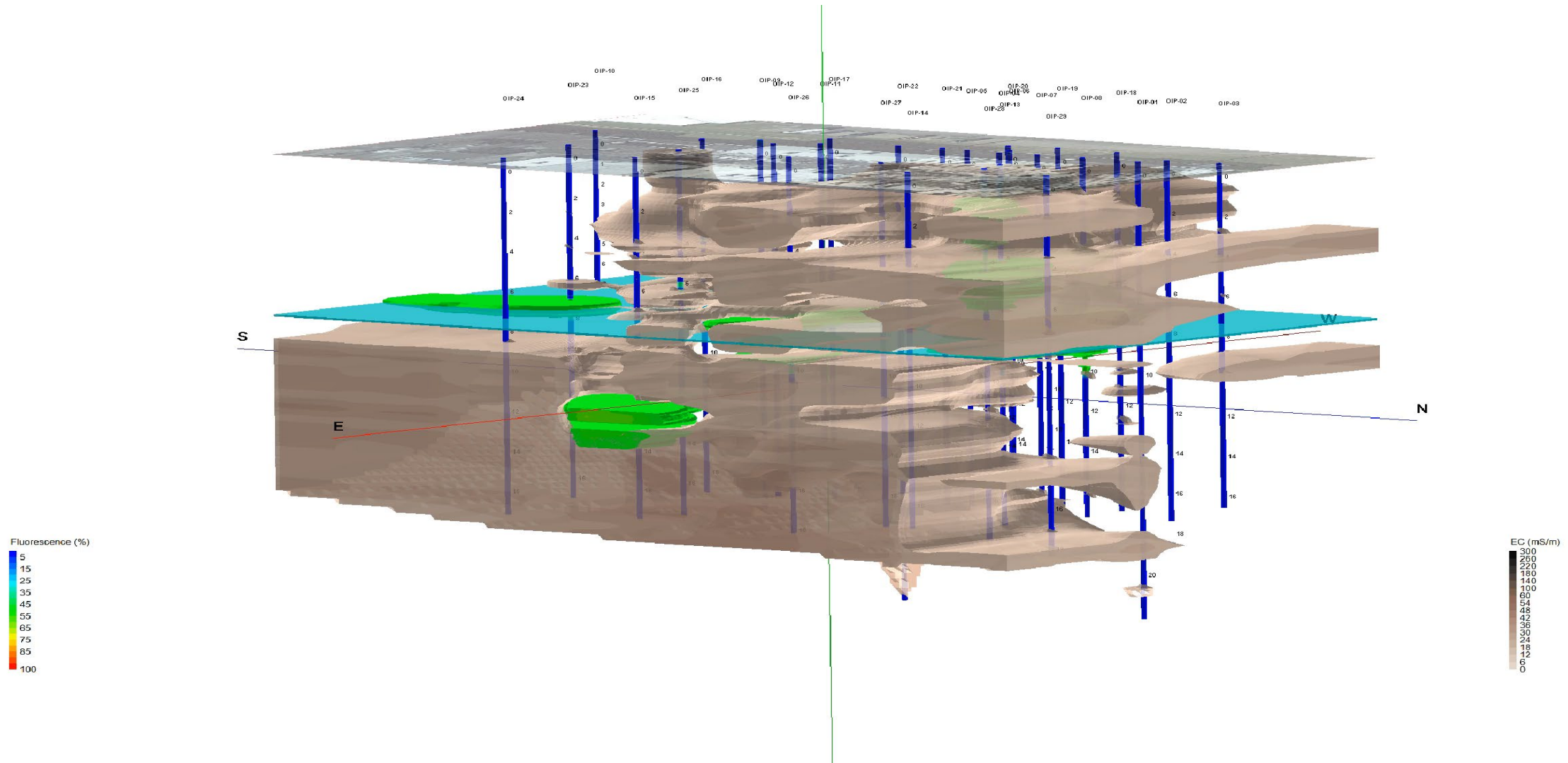
OIP - Fluorescence % 3D Model



OIP Fluorescence $\geq 50\%$ with Water Table - SE View



3D Visualization Video



Results/Lessons Learned

- Access issues were able to be resolved by using a small drill rig and a small footprint since space to maneuver was minimal. Thus, the full site was successfully investigated.
- Data produced by the HRSC indicated multiple sources of LNAPL and LNAPL at different depth intervals that may have been missed by traditional assessment methods. HRSC, however, provides thousands of data points, enabling generation of 3D models displaying lithology and contaminant distribution.
- Utilizing the 3D model, the CSM was more rapidly developed, and the client was able to identify likely active sources. Additionally, the 3D model helped aid in rapidly screening remedial technologies for LNAPL management.
- Remediation Decisions were Upgraded:
 - Stratigraphy/Transmissivity
 - Contaminates



Acknowledgements

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THANK YOU!

