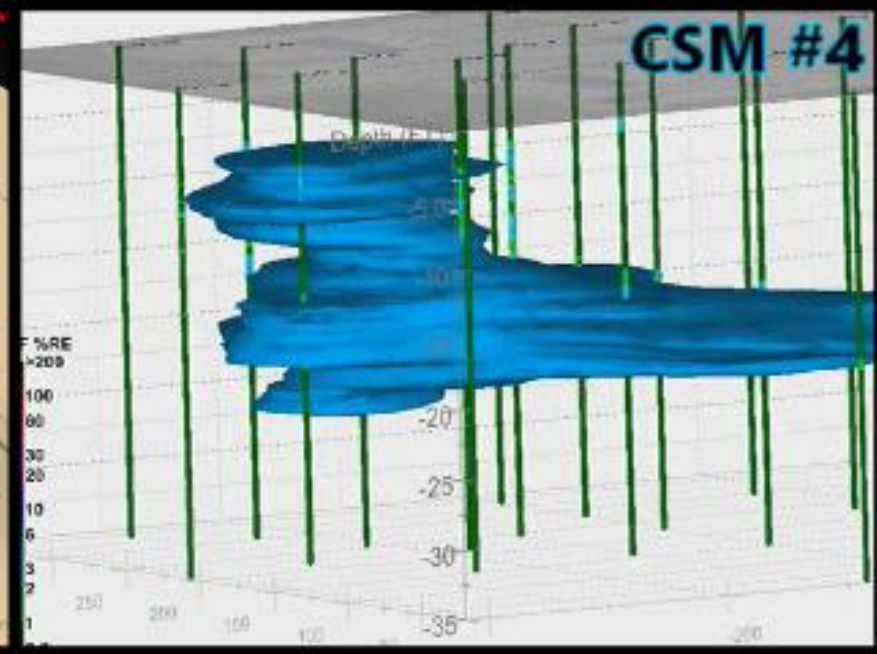
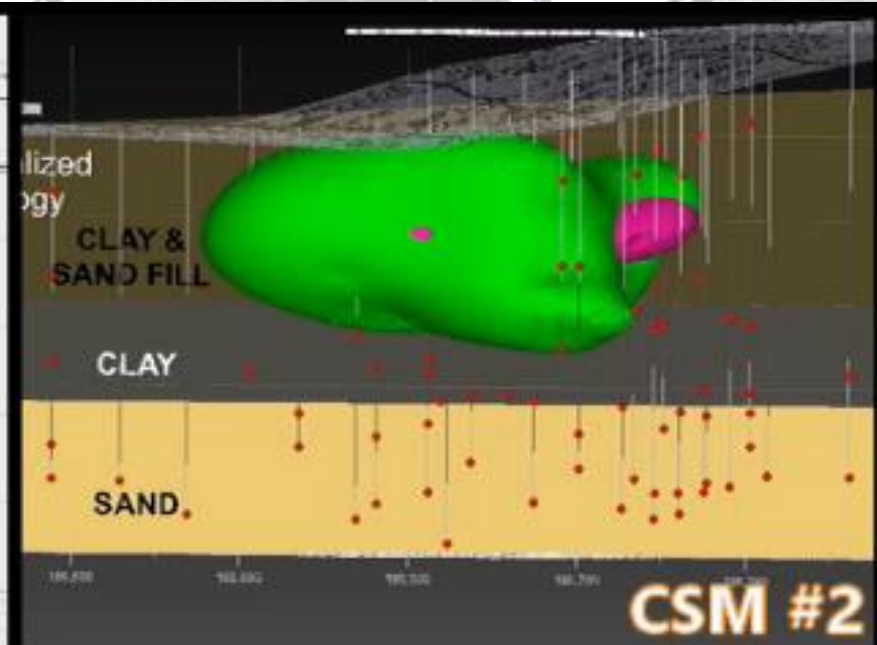
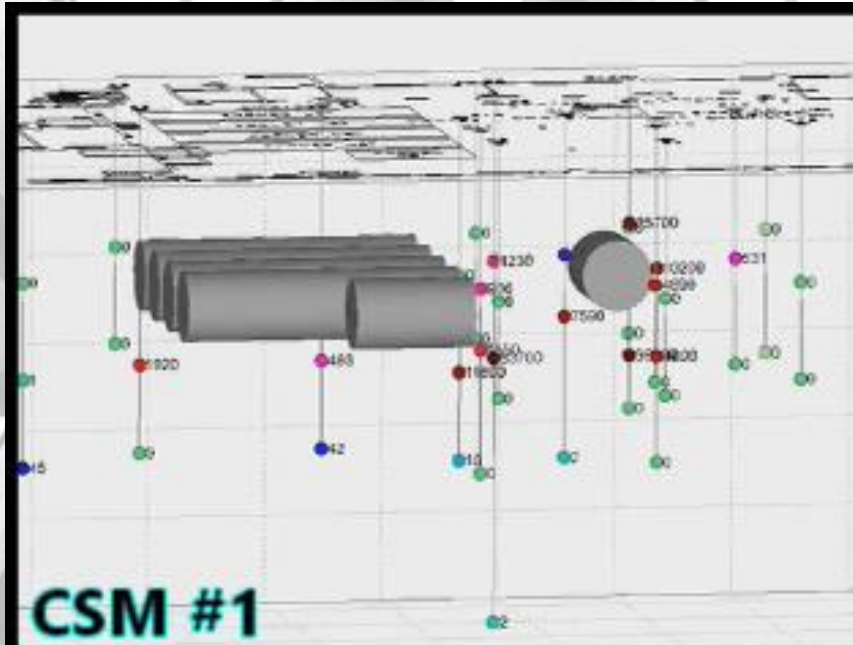


BUILDING USEFUL CONCEPTUAL SITE MODELS (CSMs) USING 3D MODELING TECHNOLOGY

Jim Depa
IPEC 2019



SM&A

ST. JOHN-MITTELHAUSER & ASSOCIATES

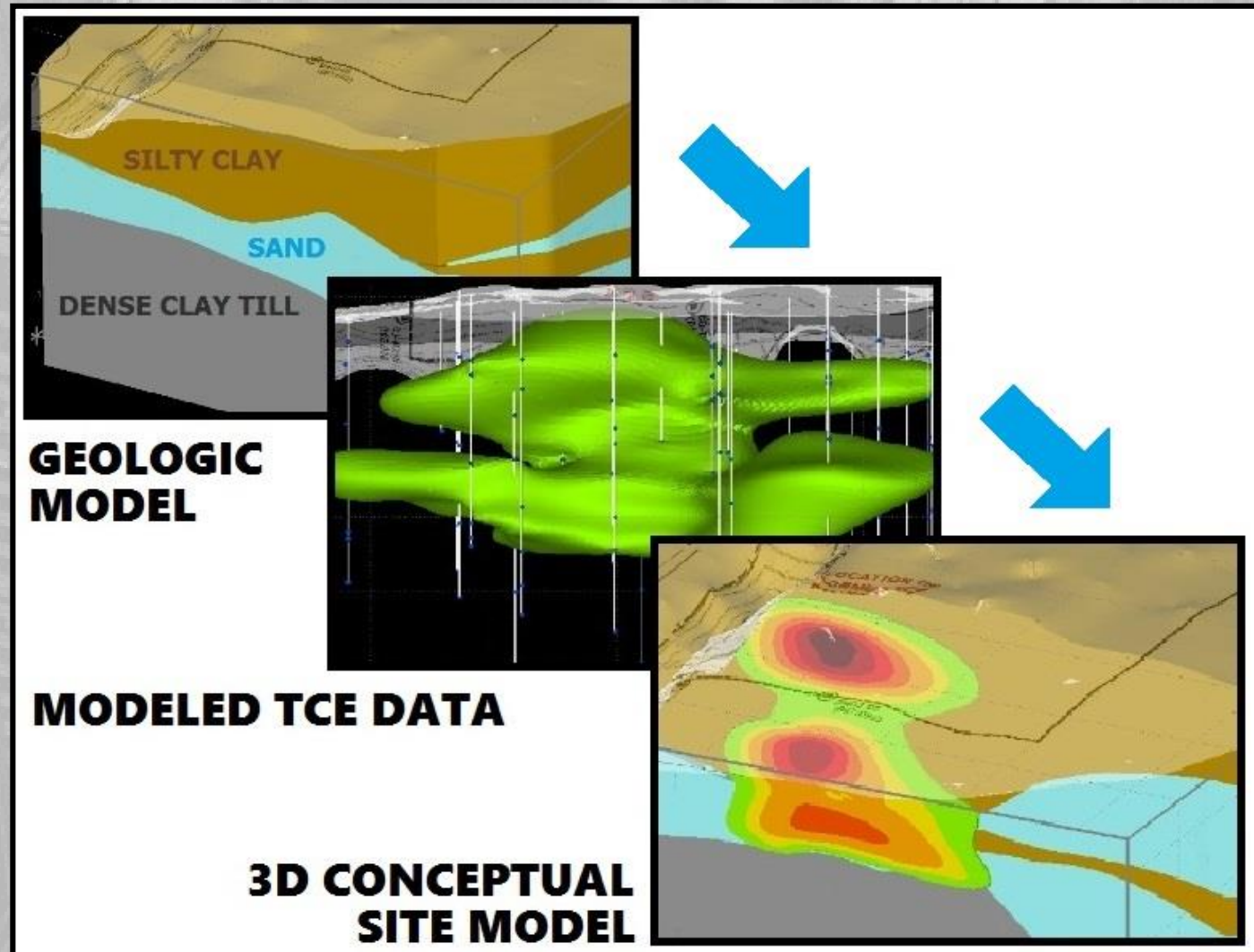
A **Terracon** COMPANY

WHAT IS A CONCEPTUAL SITE MODEL (CSM)?

Creation of a CSM

“A CSM is a tool used to organize and communicate information about the characteristics of a site.”

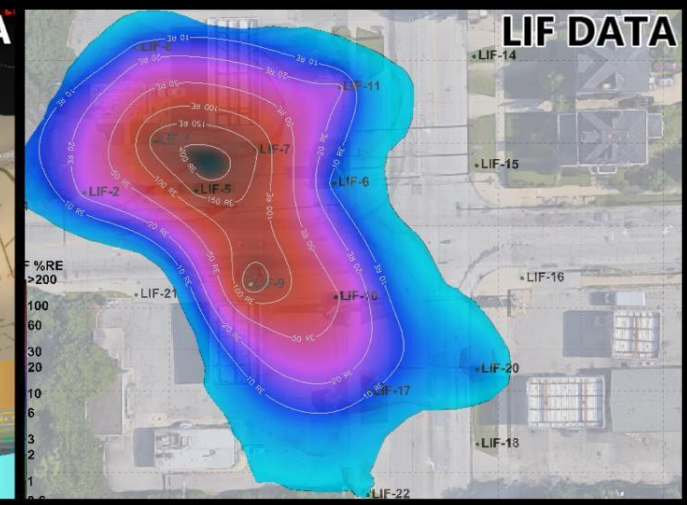
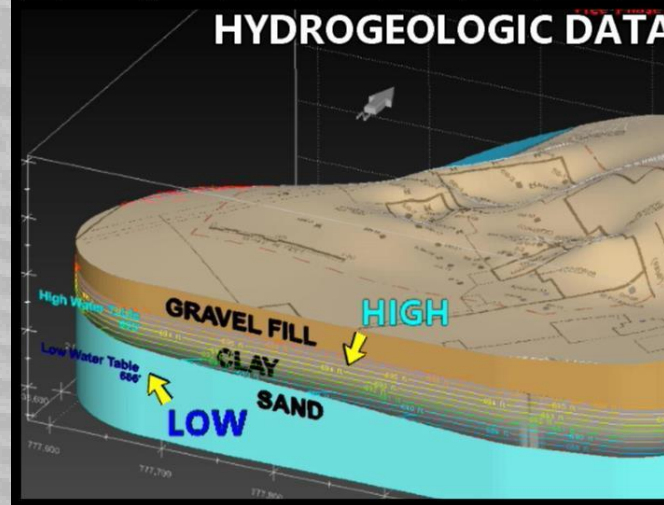
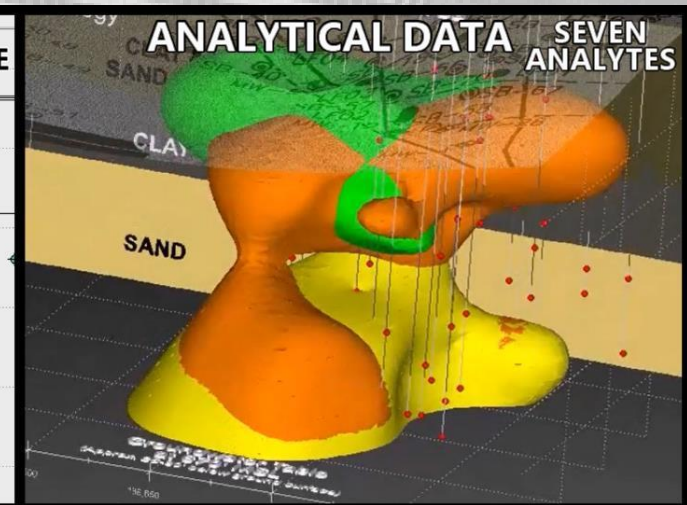
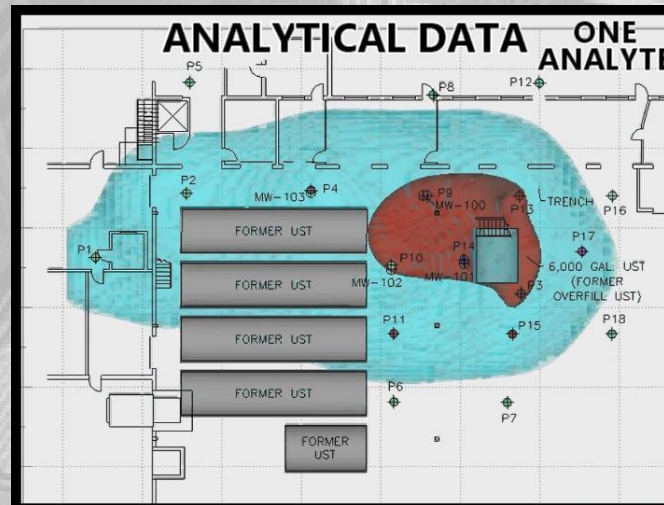
-USEPA RCRA Guidance Document



FORMAT

4 CSMs (Case Studies)

- Type of Data
- Site Background
- 3D Model
- Utility

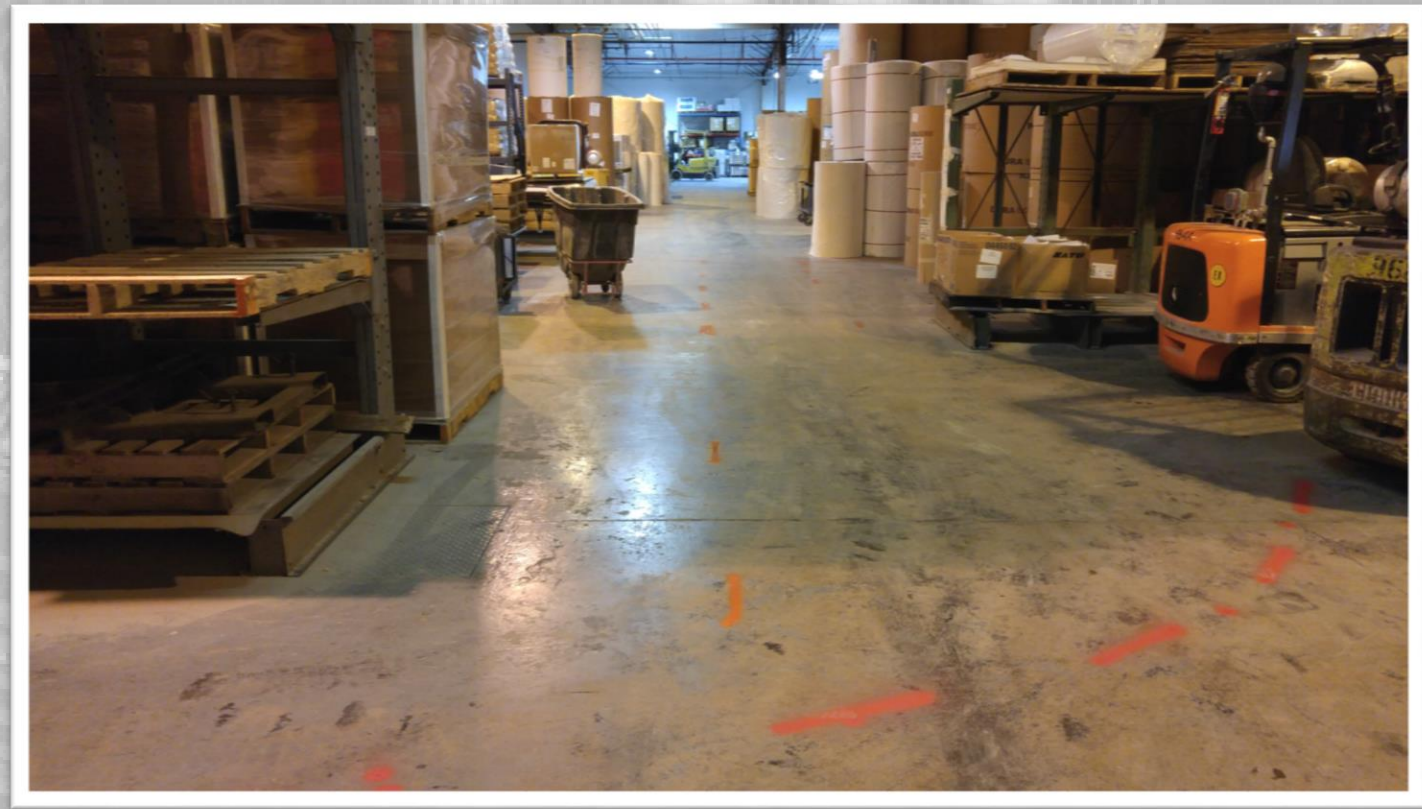


CSM #1

ANALYTICAL DATA

(ONE ANALYTE)

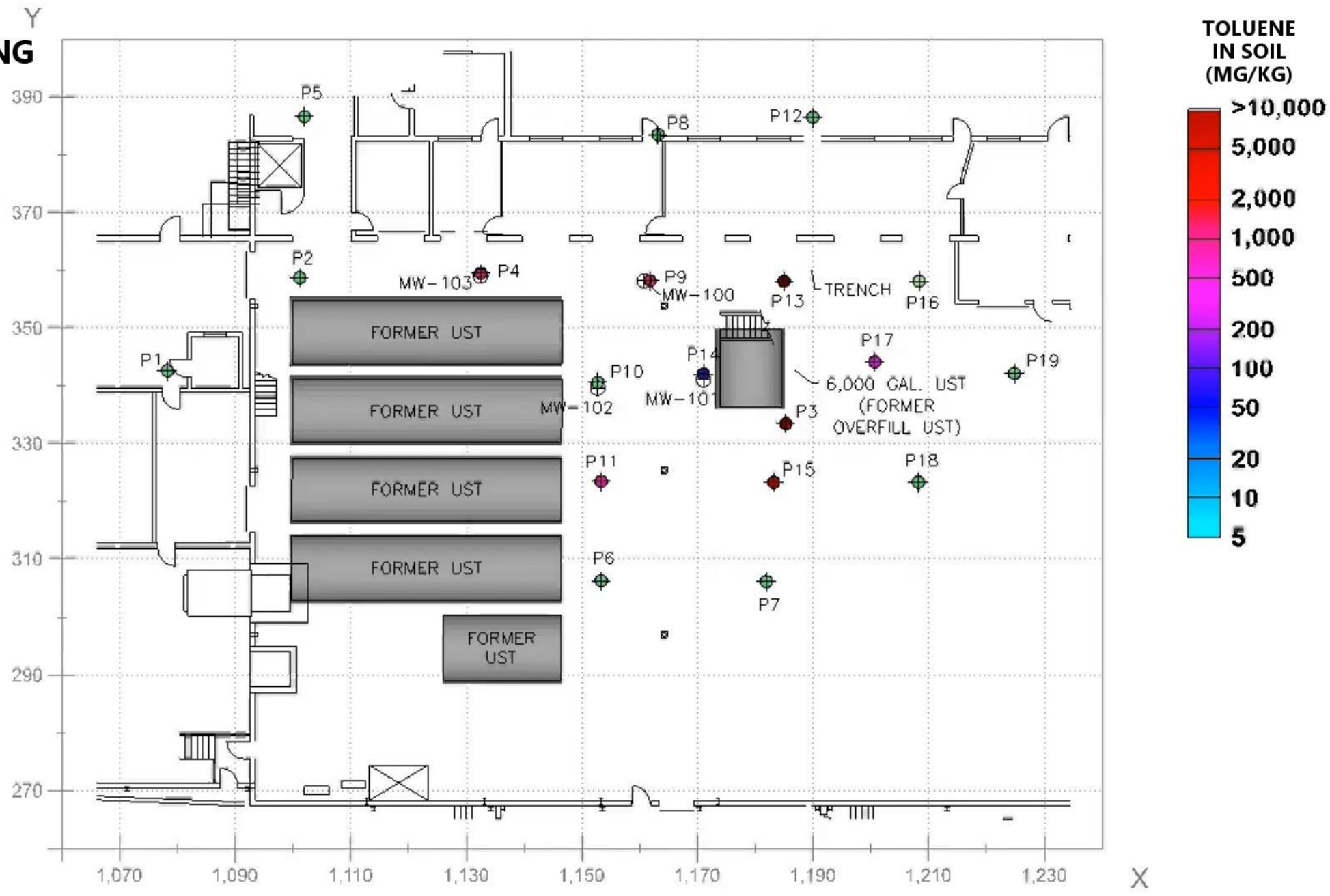
Plastics Manufacturer



Facility Interior

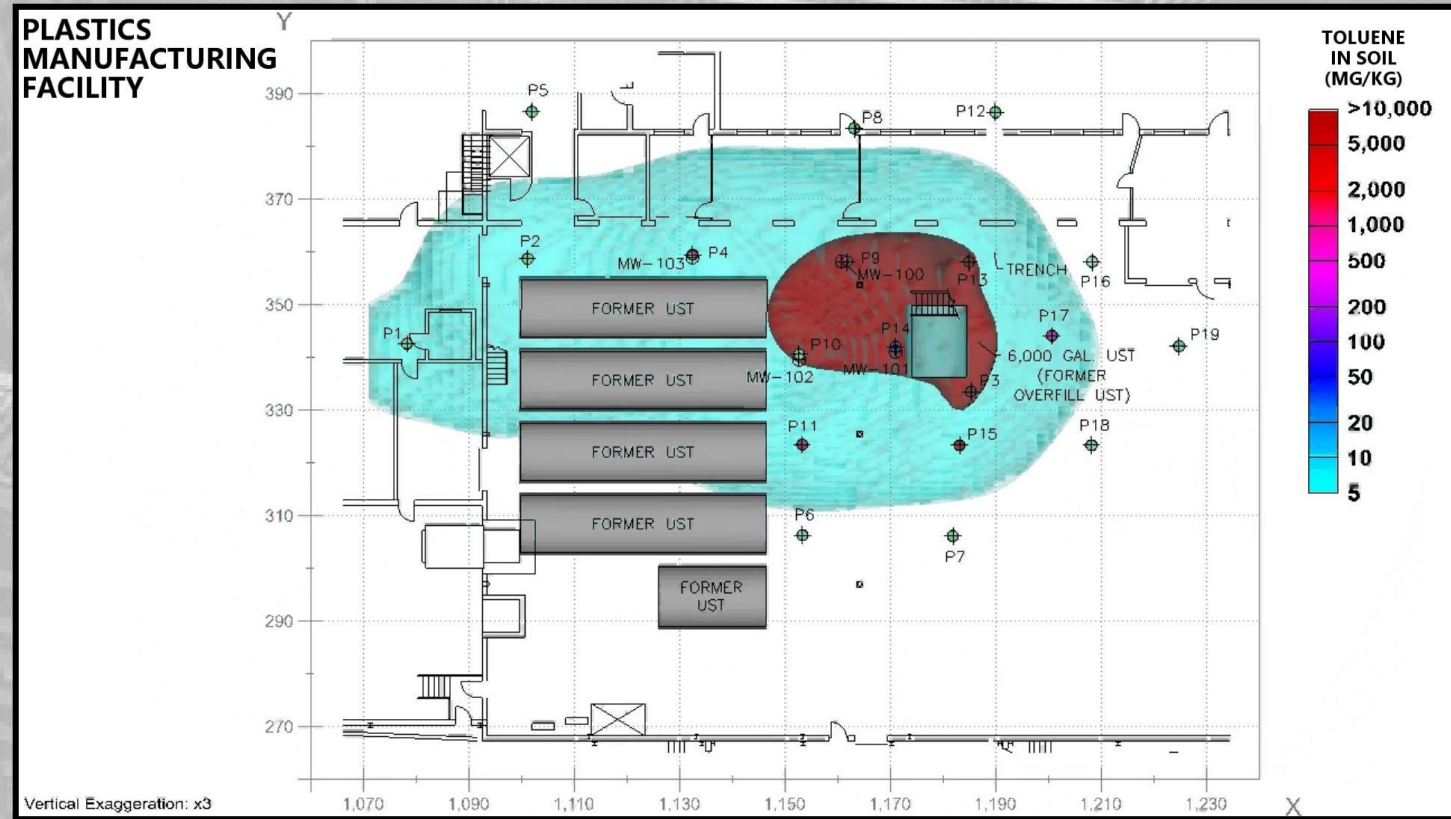
- Six Underground Chemical Storage Tanks
- 2016 Investigation – 19 Soil Borings, 51 Soil Samples
- Toluene in Soil Up to **53,700 mg/kg**
- Generalized Geology: Silty Sandy Clay / Sand Fill in Tank Cavities

PLASTICS MANUFACTURING FACILITY



WHY BUILD THE MODEL?

- Great Visualization Tool for the Client
- Estimated the Volume of Impacted Soil: **2,300 yards³**
- Estimated the Mass of the Contamination: **13,700 lbs.**
*81% of the Mass is Located in the Dark Red Volume



CSM #2

ANALYTICAL DATA (SEVEN ANALYTES)

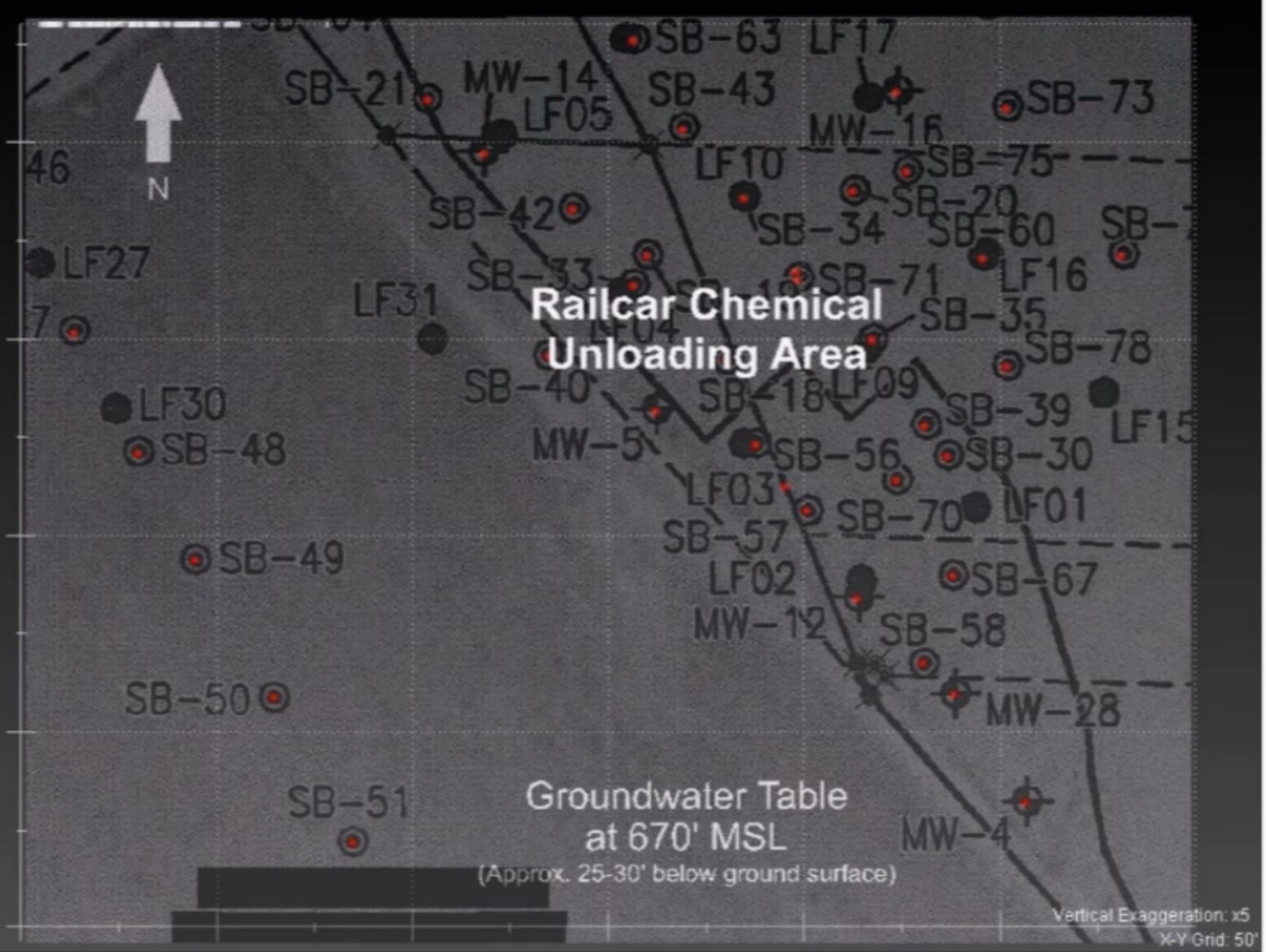
Tank Unloading Area in a Railyard



Rail Yard

- 2001 Investigation Identified Multiple Hydrocarbon Contaminants in Soil
- Over 30 Soil Borings and 100 Soil Samples
- Remedial Exceedances of Seven Contaminants
- Generalized Geology: Clayey Sandy Fill, Clay, Sand Unit

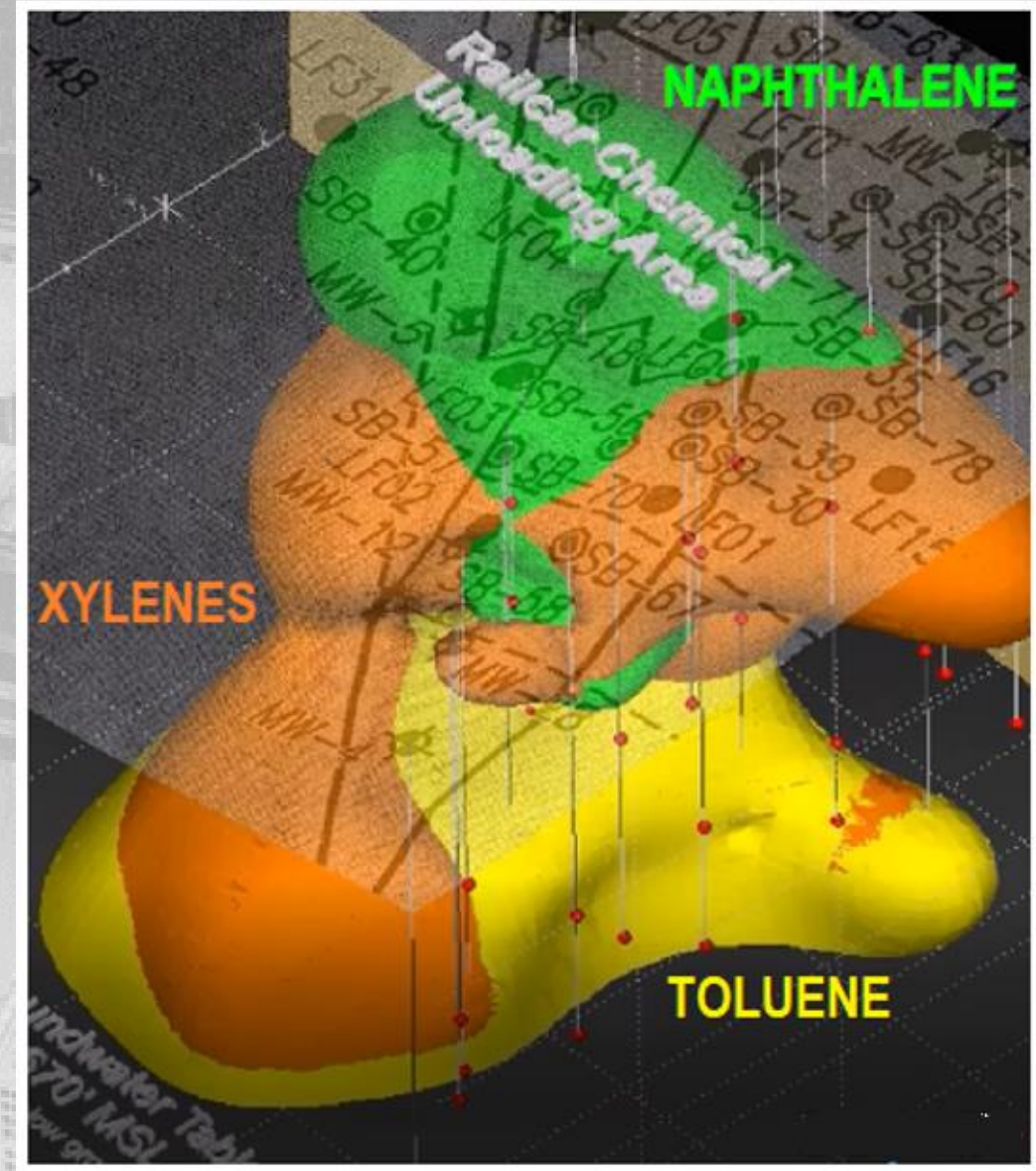
Chemical	(mg/kg) Remediation Objective
1,2,4-Trimethylbenzene	90
1,3,5-Trimethylbenzene	430
Isopropylbenzene	42
Ethylbenzene	160
Naphthalene	170
Xylenes (Total)	170
Toluene	96



7 Chemical Constituents
107 Soil Sample Locations
749 Total Data Points

WHY BUILD THE MODEL?

- Identified Locations Where Additional Data is Needed
- Simplified a Large Amount of Data
- Helped Plan the Excavation



CSM #3

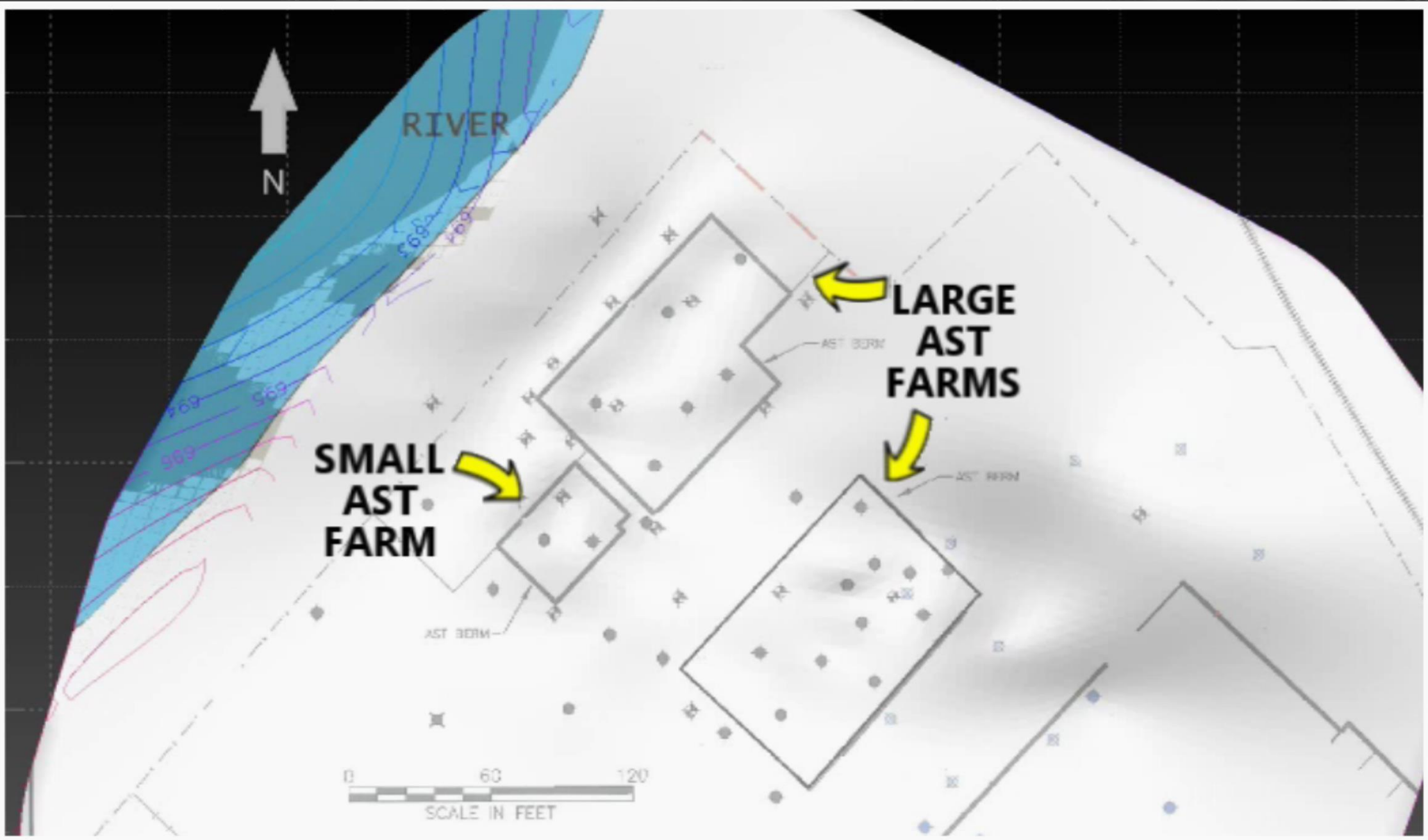
HYDROGEOLOGIC DATA

Former AST Farm



Former Tank Farm

- Free-Phase LNAPL (Mineral Spirits) Detected in Groundwater
- Unexplained Distribution and Migration of LNAPL
- Site Adjacent to a Major River
- Generalized Geology: Gravel Fill, **Clay (Variable Thickness)**, Sand & Gravel

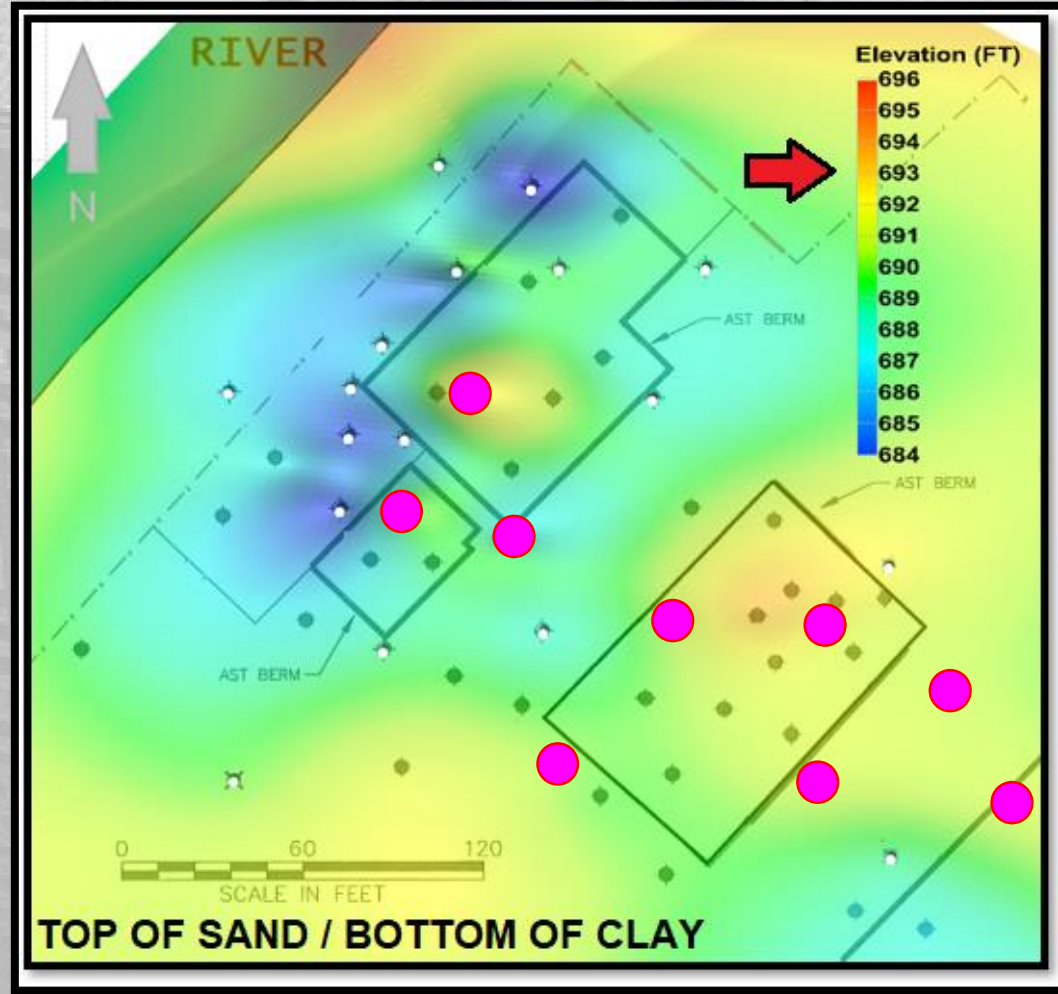
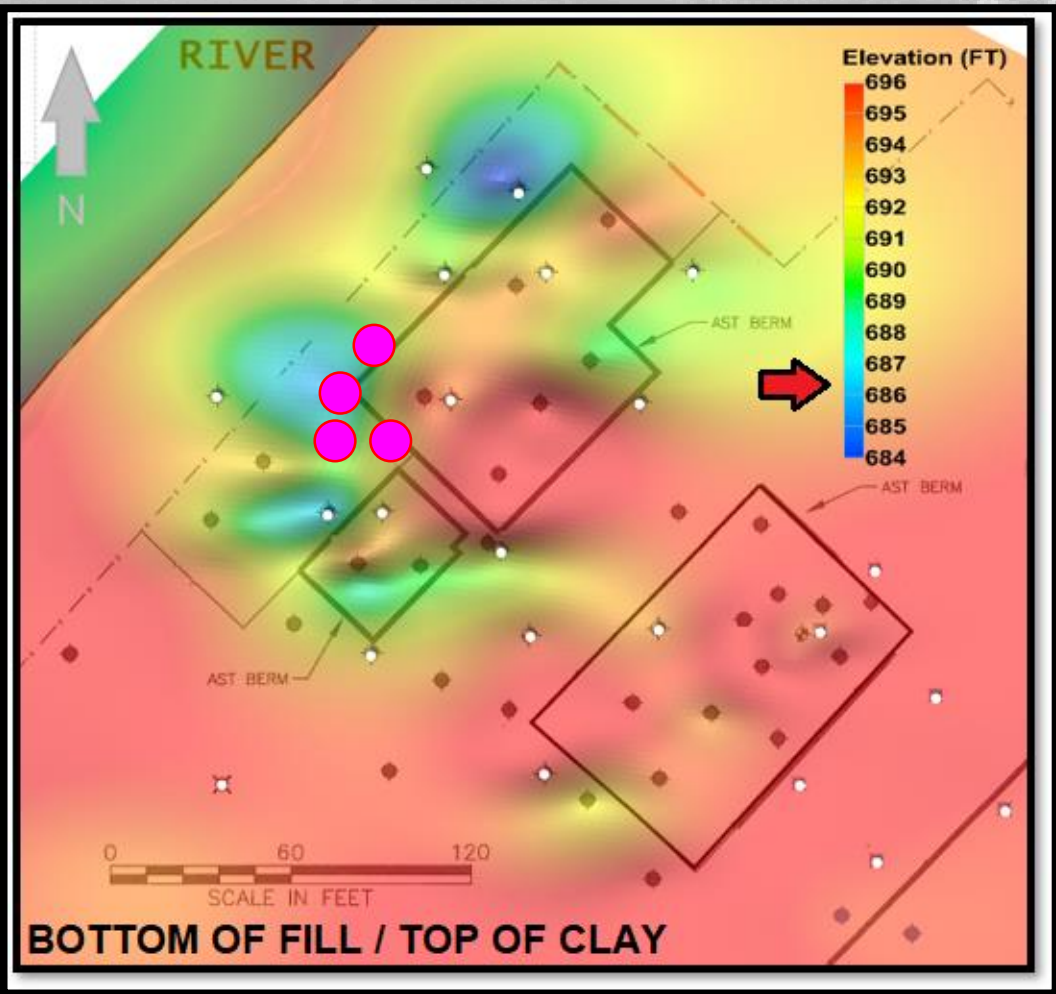


WHY BUILD THE MODEL?

● LNAPL Present in MW

Structural Lows in Fill

Structural Highs in Sand

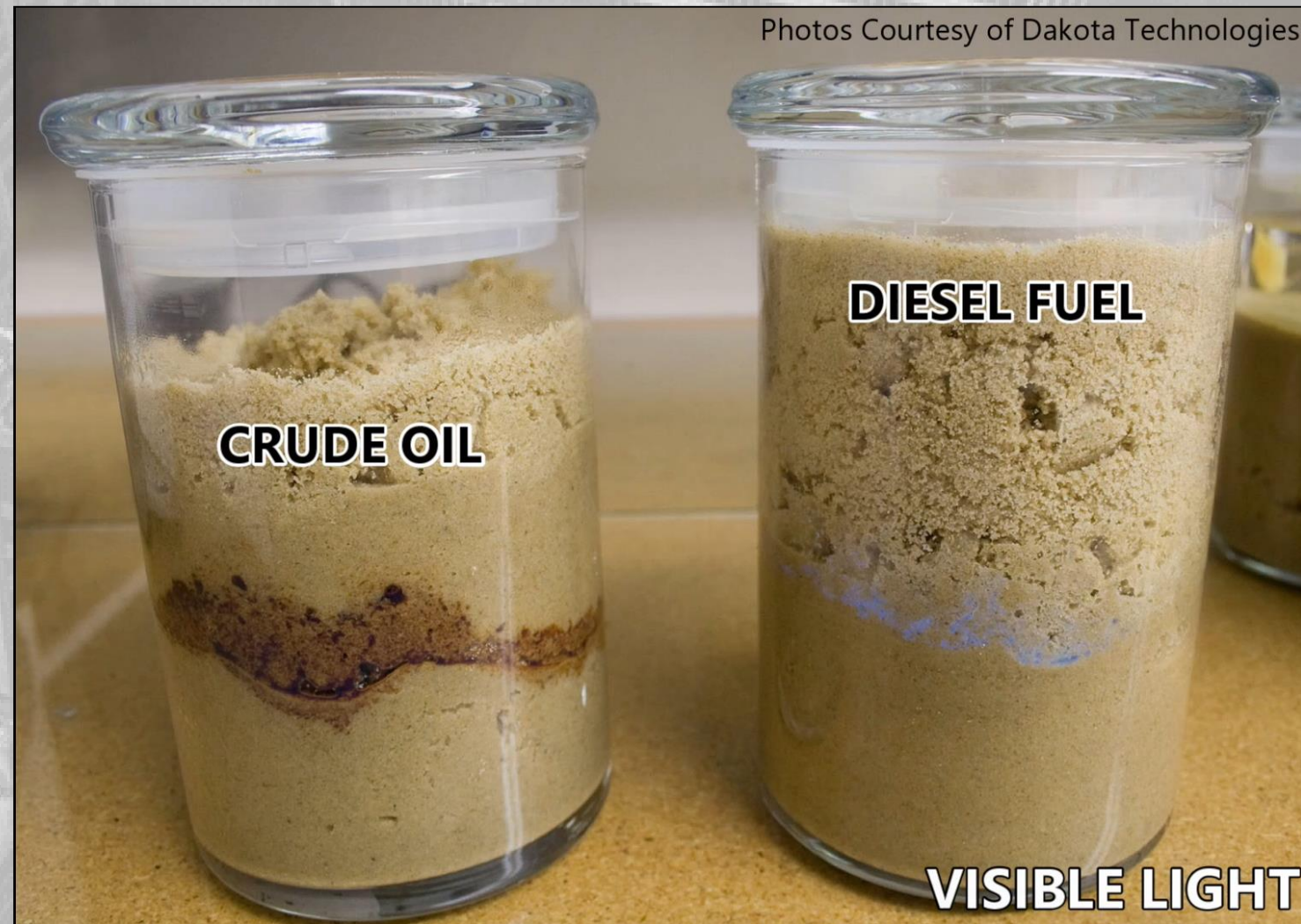


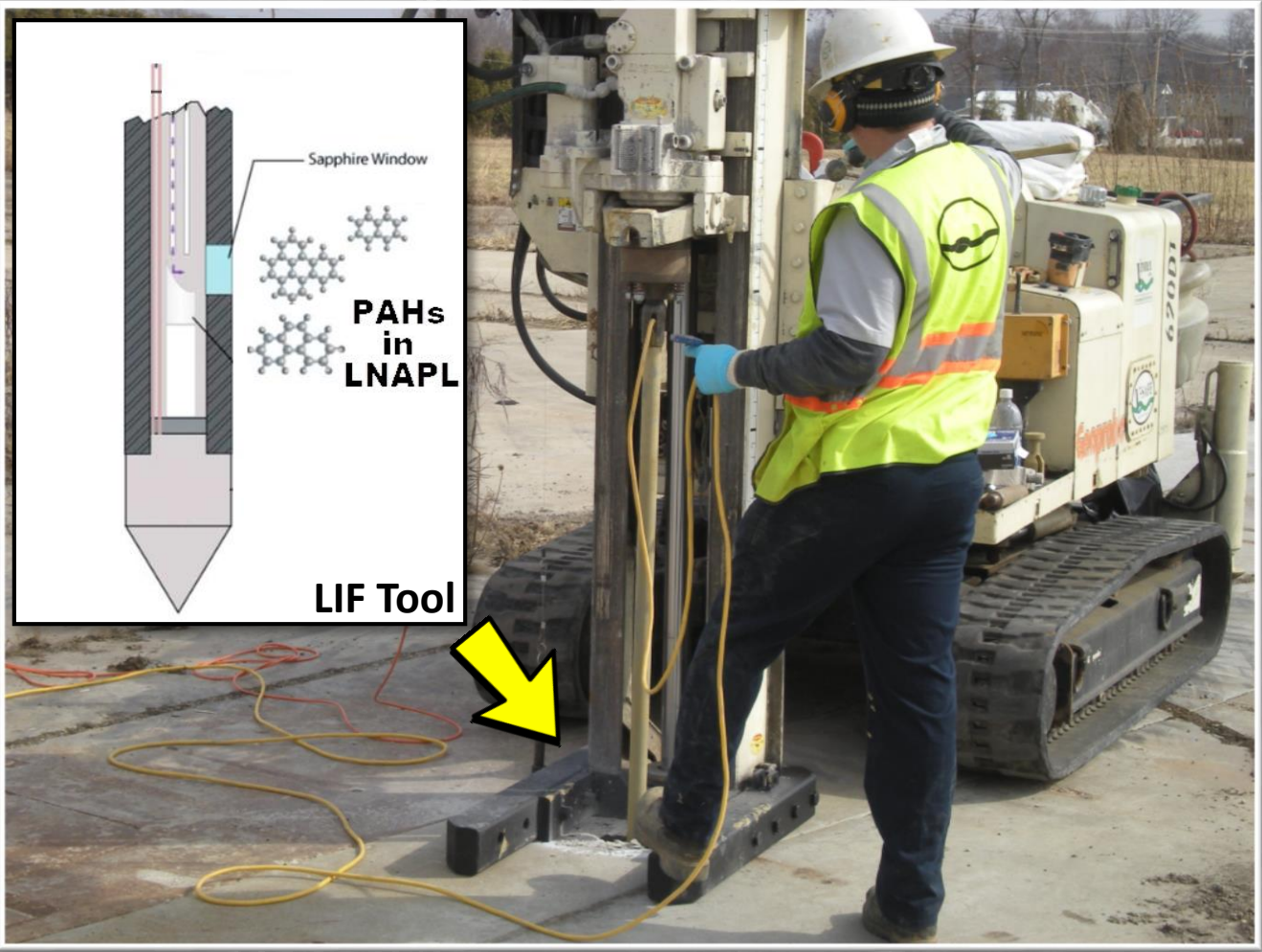
CSM #4

HIGH-RESOLUTION
LIF DATA

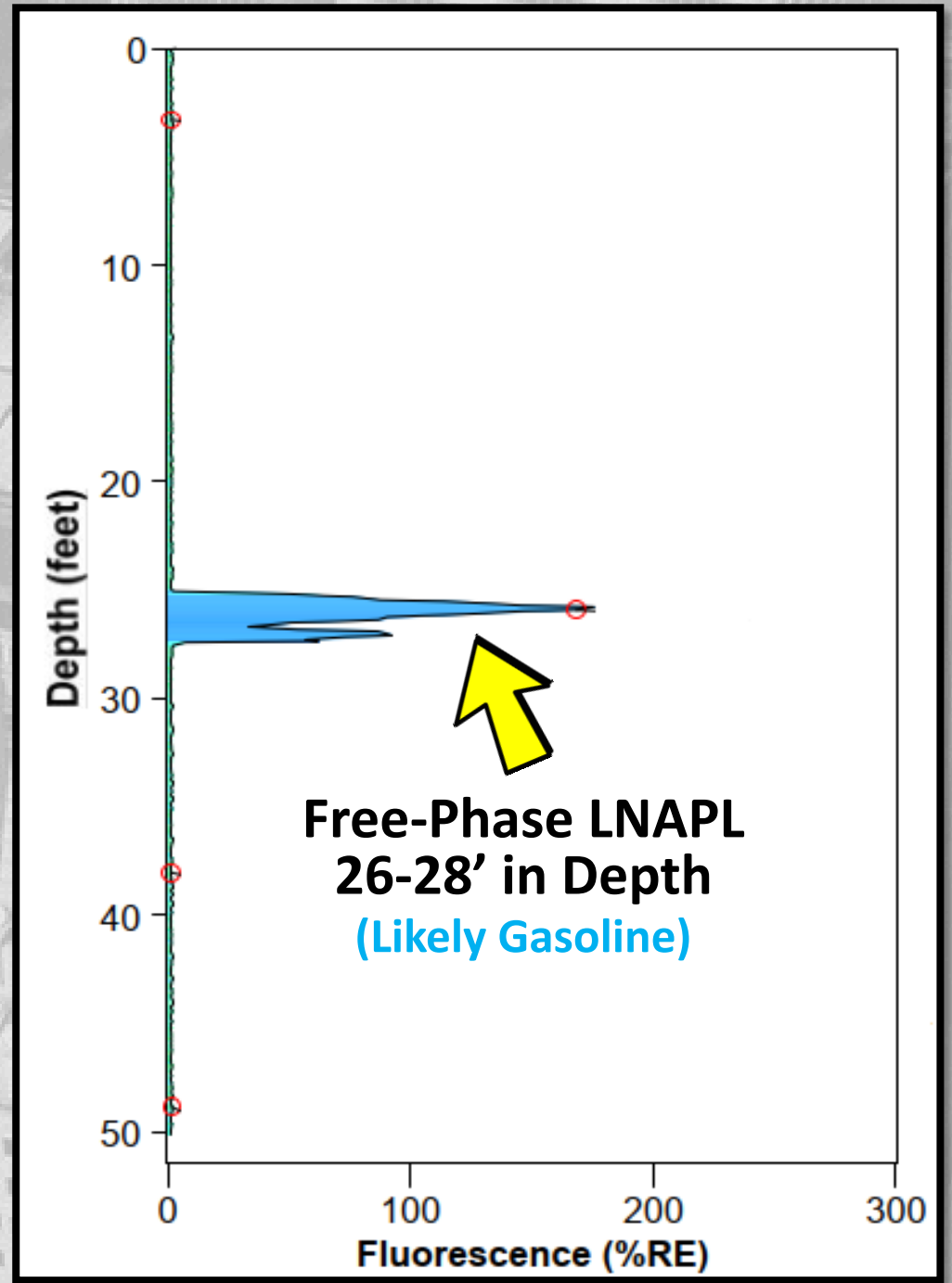
Gas Station

- Laser-Induced Fluorescence (LIF) Technology
- Can Identify and Help Quantify Free-Phase LNAPL in Soil and Groundwater





LIF Drilling

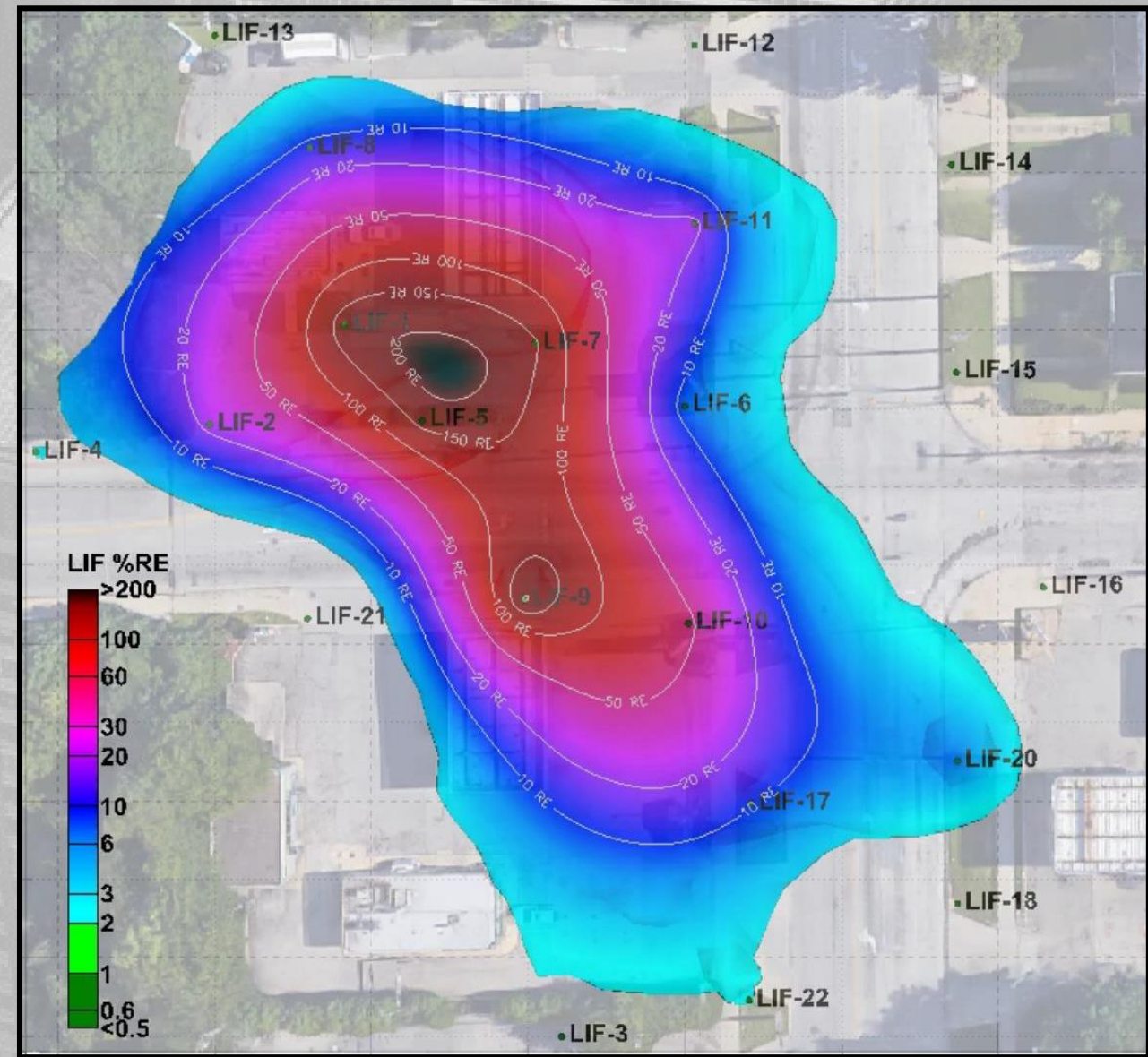


LIF Boring Log



WHY BUILD THE MODEL (AND USE LIF)?

- Large Amount of Data Generated (>8,000 Data Points)
- Excellent Visualization Tool for Clients and Regulators
- No Monitoring Wells



VIDEOS ON



"Jim Depa IPEC 2019"

**THANK
YOU**

ANY QUESTIONS?



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A Terracon COMPANY