LNAPL Transmissivity and Oil-specific Volume as Key Components of the Conceptual Site Model

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IPEC 2013 | San Antonio, Texas

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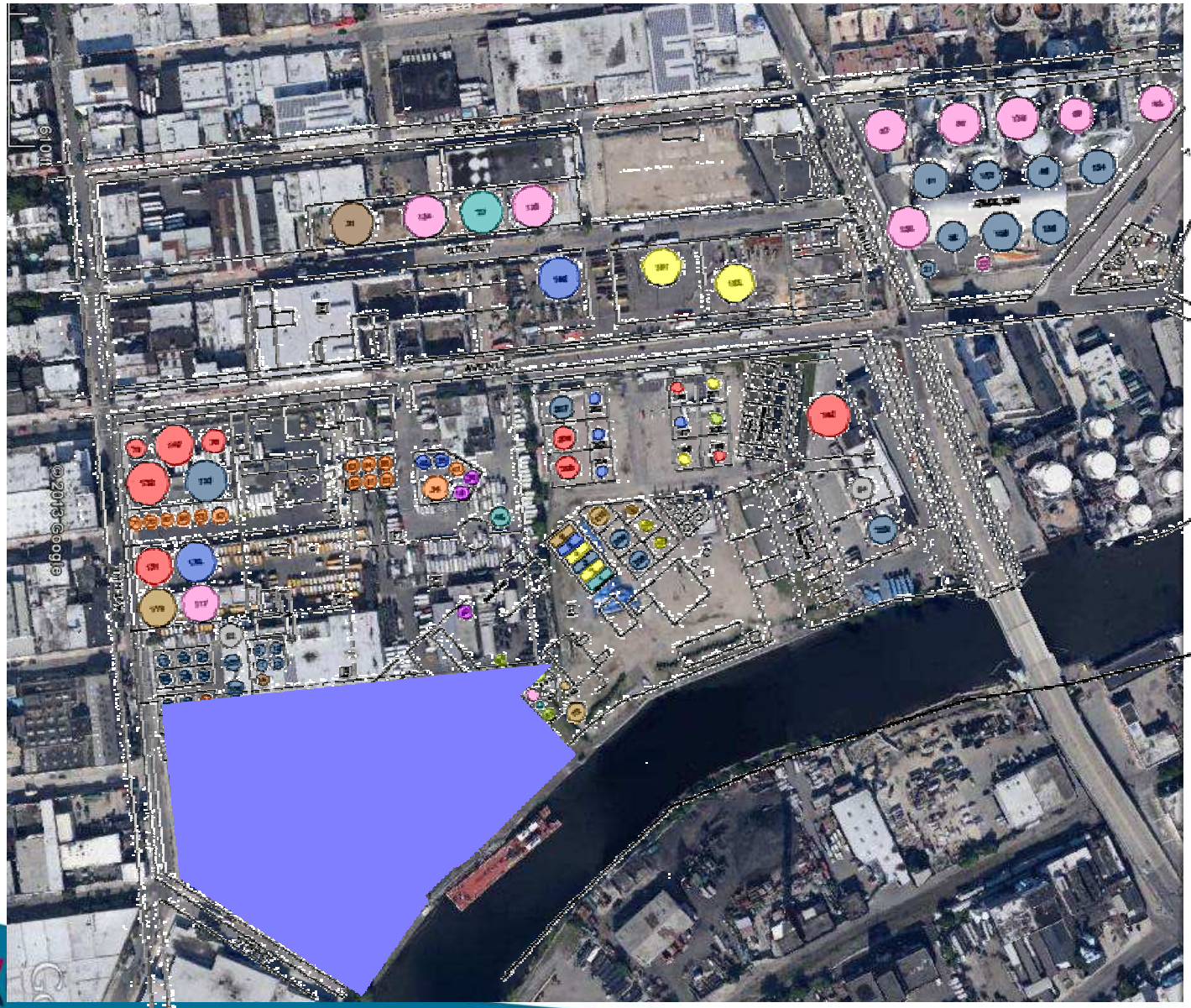
Presentation Outline

Objective

To Develop a Conceptual Site Model to Aid in LNAPL Recovery Planning

- Site History and Features
- Previous Investigations
- LNAPL CSM Field Data Collection
- LNAPL CSM Data Analysis
- Data Synthesis and Presentation
- LNAPL CSM and Recovery Assessment

Site History and Features



Urban Area

Former 50-acre Refinery

10-acre Petroleum Storage Facility

Near Creek

Flat Topography

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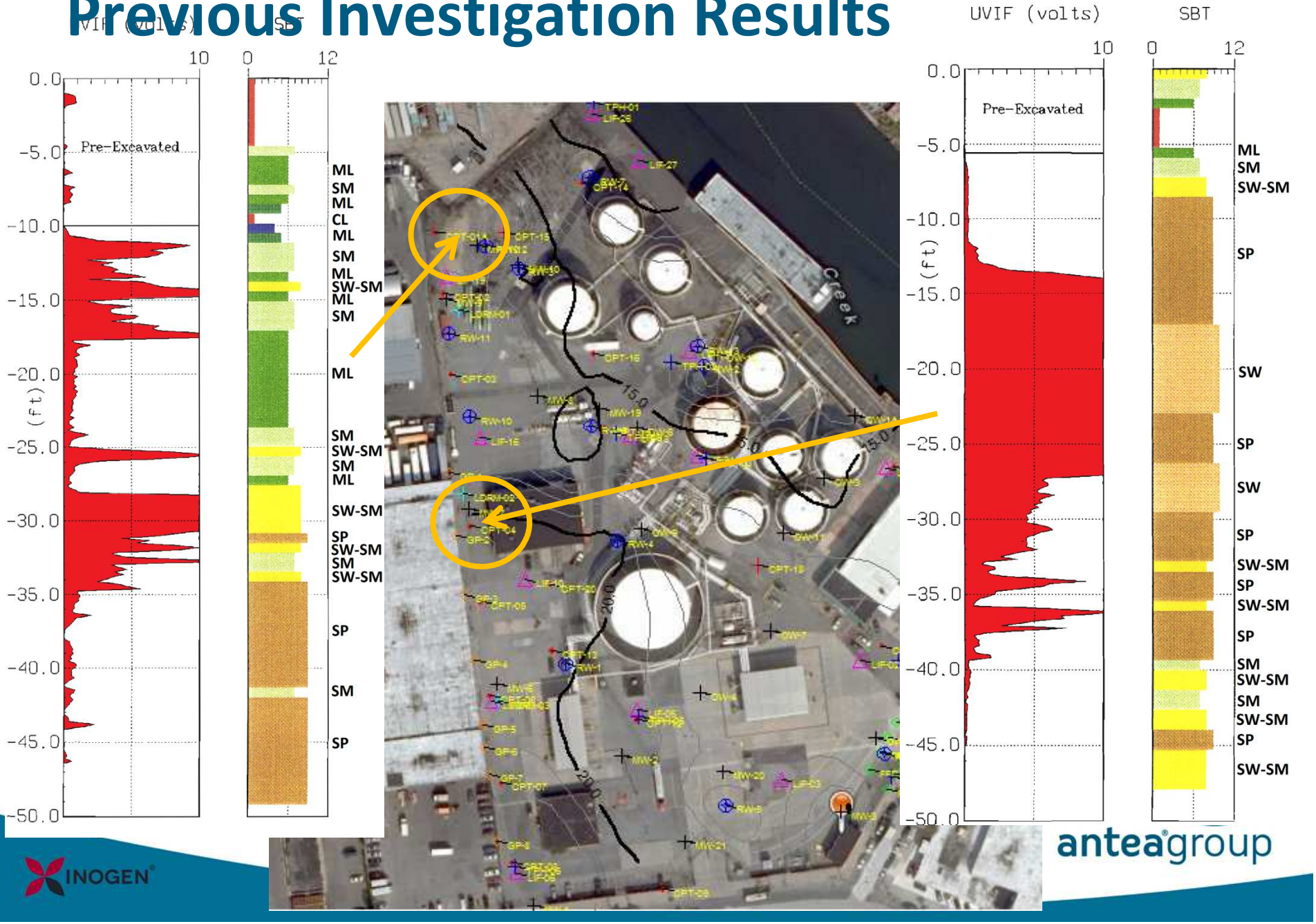
Previous Investigation Results



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Previous Investigation Results

LNAPL Thickness Contours – February 17, 2009

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LNAPL CSM Field Data Collection

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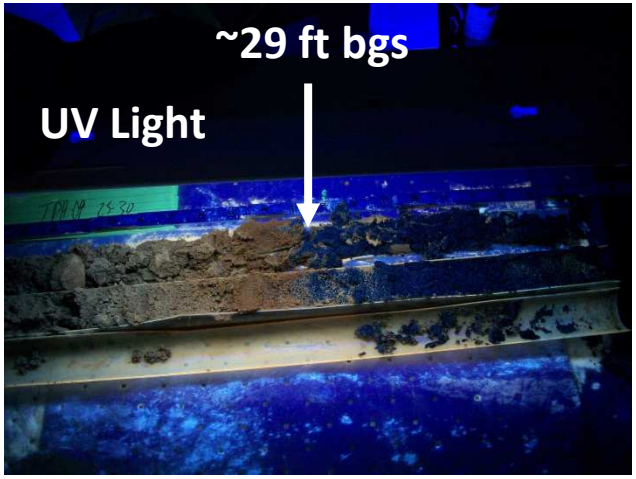
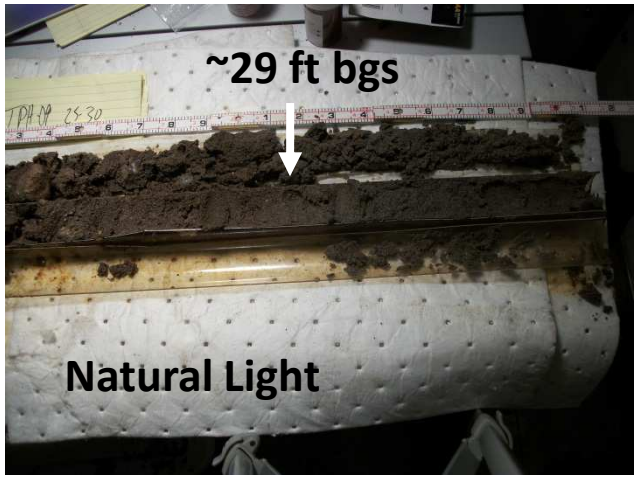
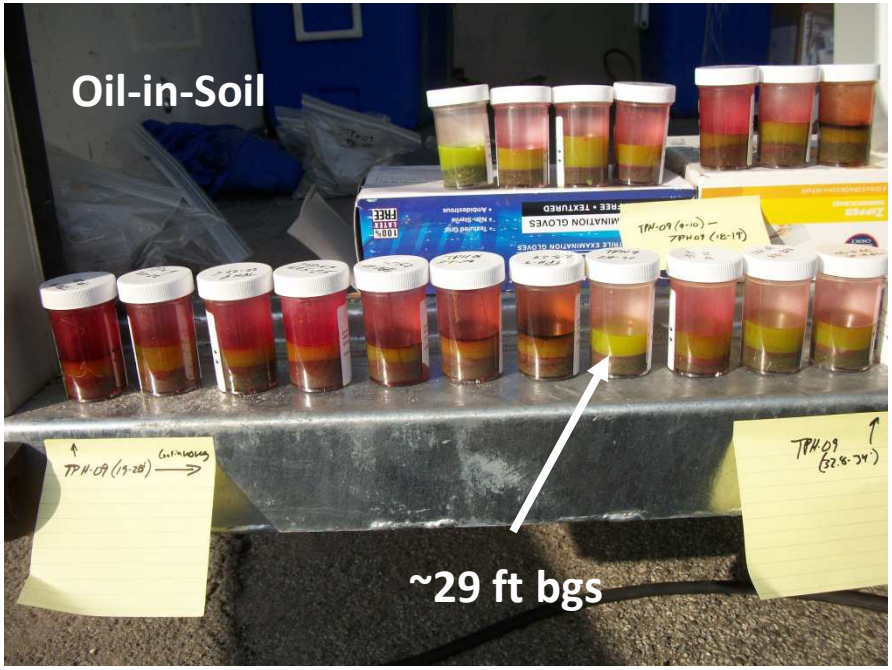
LNAPL CSM Field Data Collection







TPH-09 (25 – 30 feet bgs)

Borehole Logging and Sampling Procedures

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LNAPL CSM Field Data Collection

Viscosity Distribution and Contour Map

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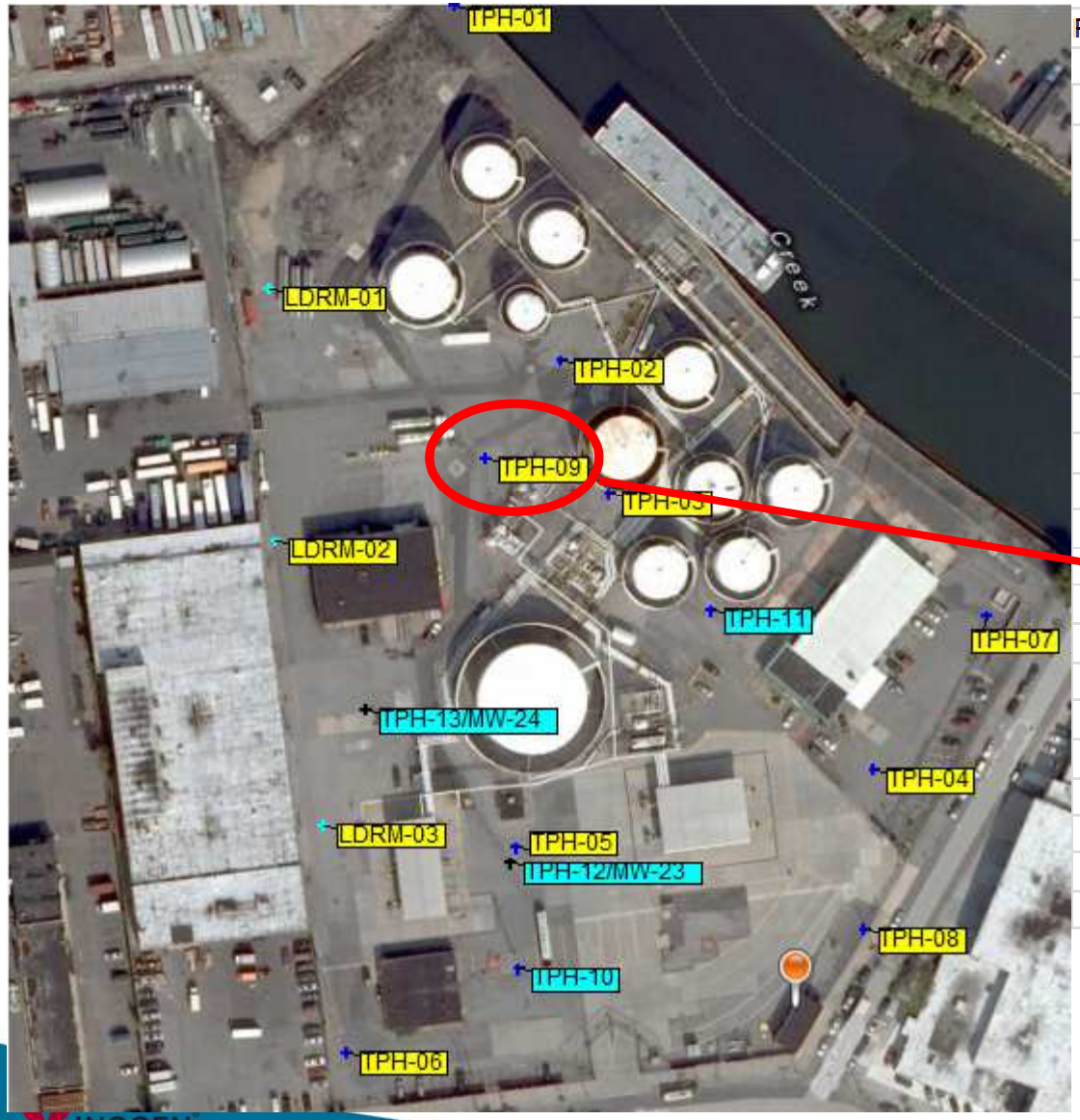
LNAPL CSM Data Analysis



Project No.			Porosity =	0.38
Boring	TPH-09			
Depth (feet)	GRO + TPH (mg/kg)	θ_o (-)	V_o (ft^3/ft^2)	S_o (-)
9.25	5.32	0.0000	0.000	0.000
14	7690	0.0152	0.048	0.040
15.5	6540	0.0129	0.019	0.034
17	8570	0.0169	0.025	0.045
18.5	46100	0.0911	0.410	0.240
26	20100	0.0397	0.199	0.105
28.5	18100	0.0358	0.063	0.094
29.5	2160	0.0043	0.004	0.011
30.6	4540	0.0090	0.011	0.024
32	1700	0.0034	0.008	0.009
35.5	1980	0.0039	0.009	0.010
36.5	2650	0.0052	0.005	0.014
37.5	1570	0.0031	0.011	0.008
43.5	5.9	0.0000	0.000	0.000
44.5	8.12	0.0000	0.000	0.000
1	14.1	0.0000	0.000	0.000
		Oil Specific Volume =	0.813	

Estimation of Oil-Specific Volume

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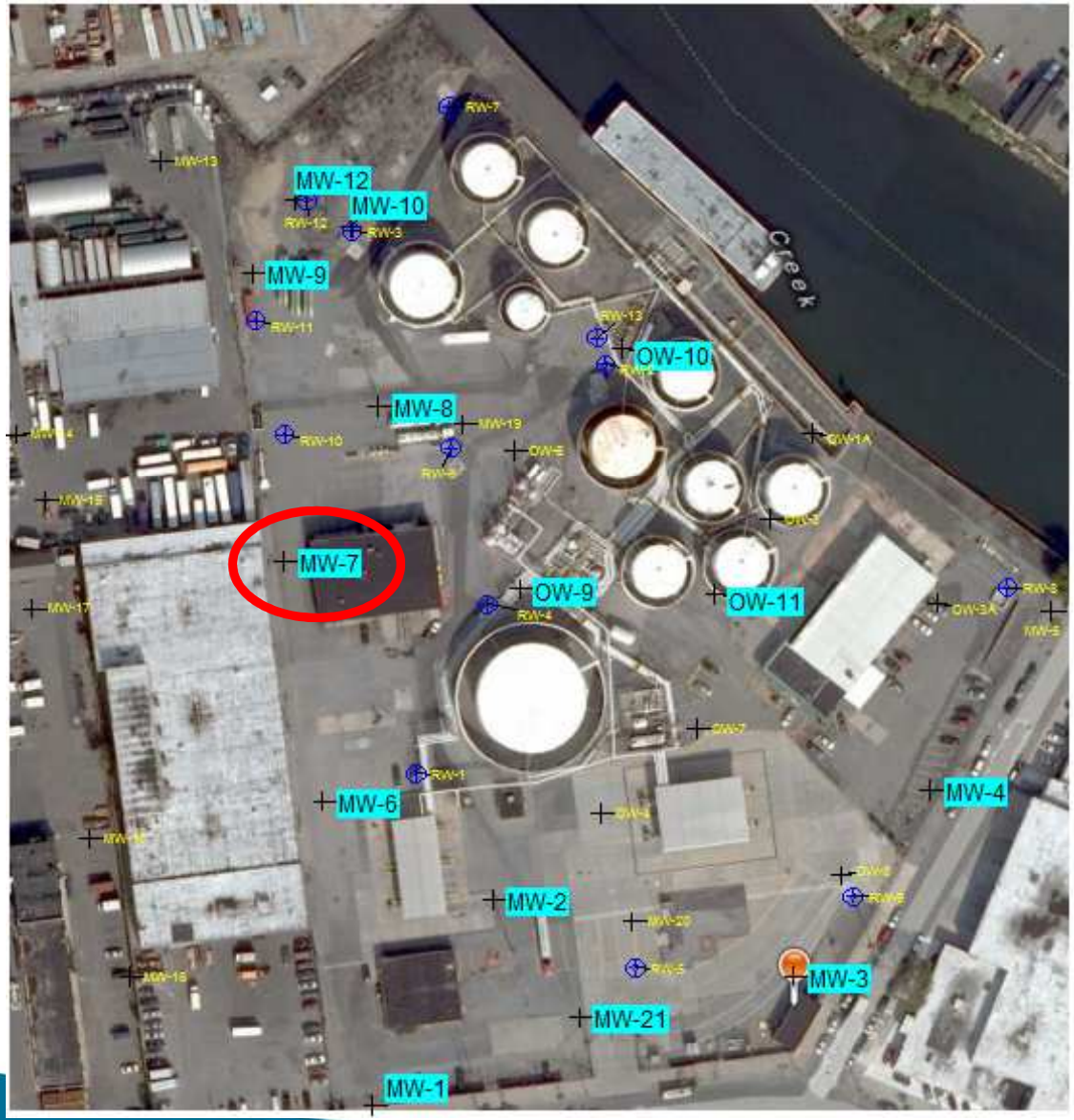
LNAPL CSM Field Data Collection



Baildown Test Well Locations

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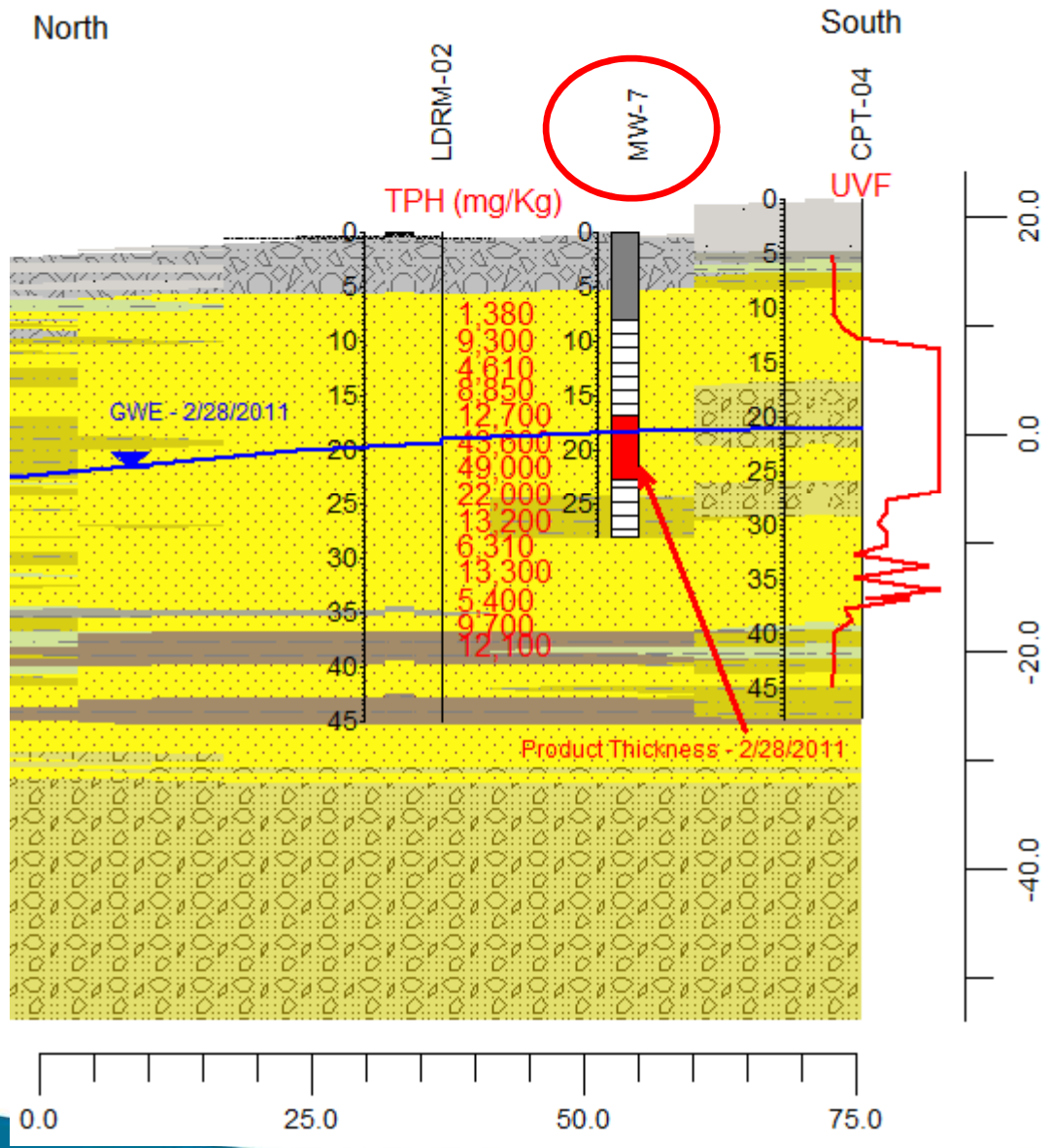
LNAPL CSM Data Analysis



Analysis of Baildown Tests MW-7

Hydrogeologic and Chemical Conditions

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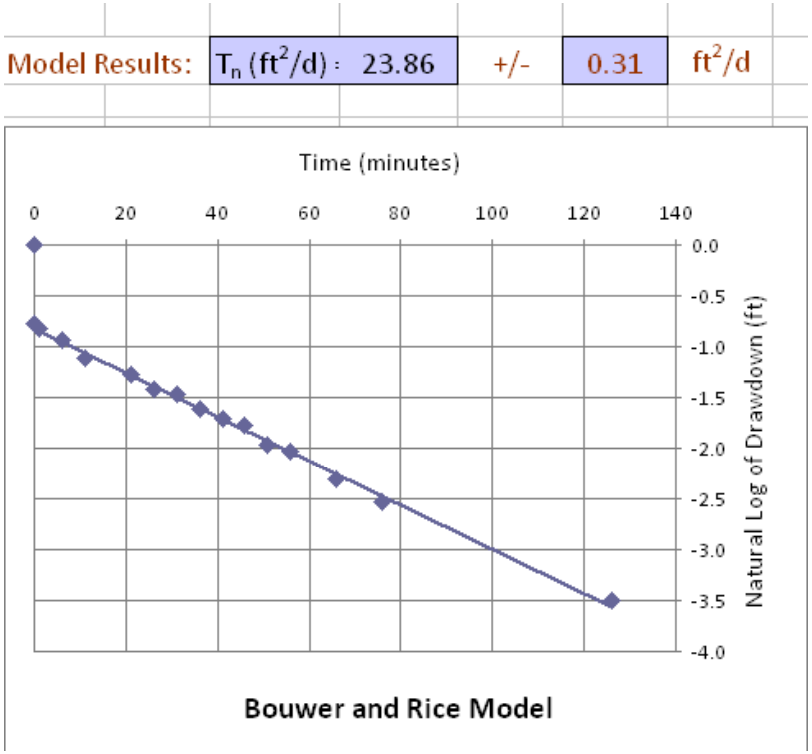
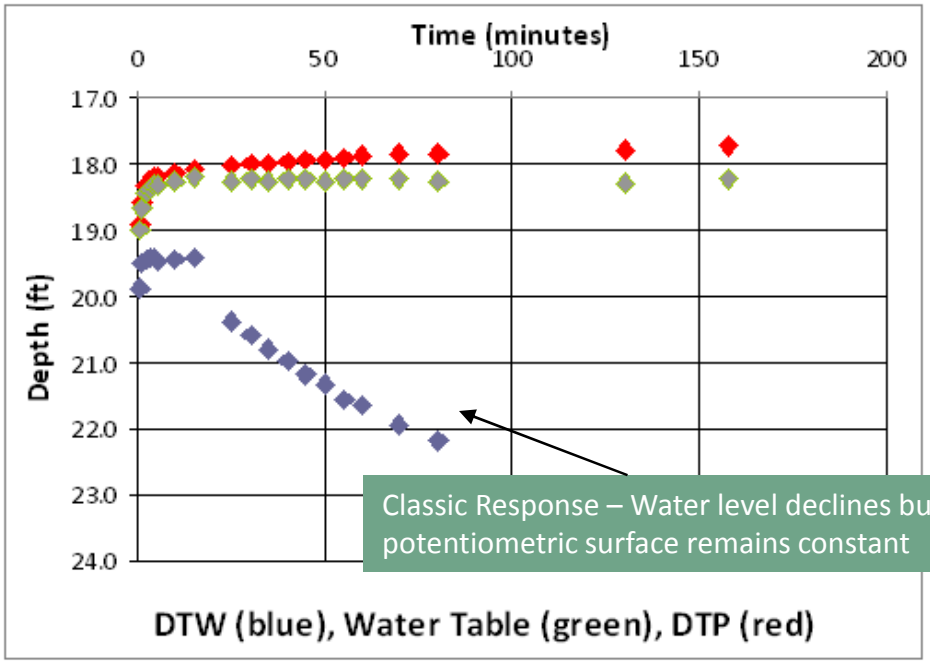
LNAPL CSM Data Analysis





Analysis of Baildown Tests MW-7

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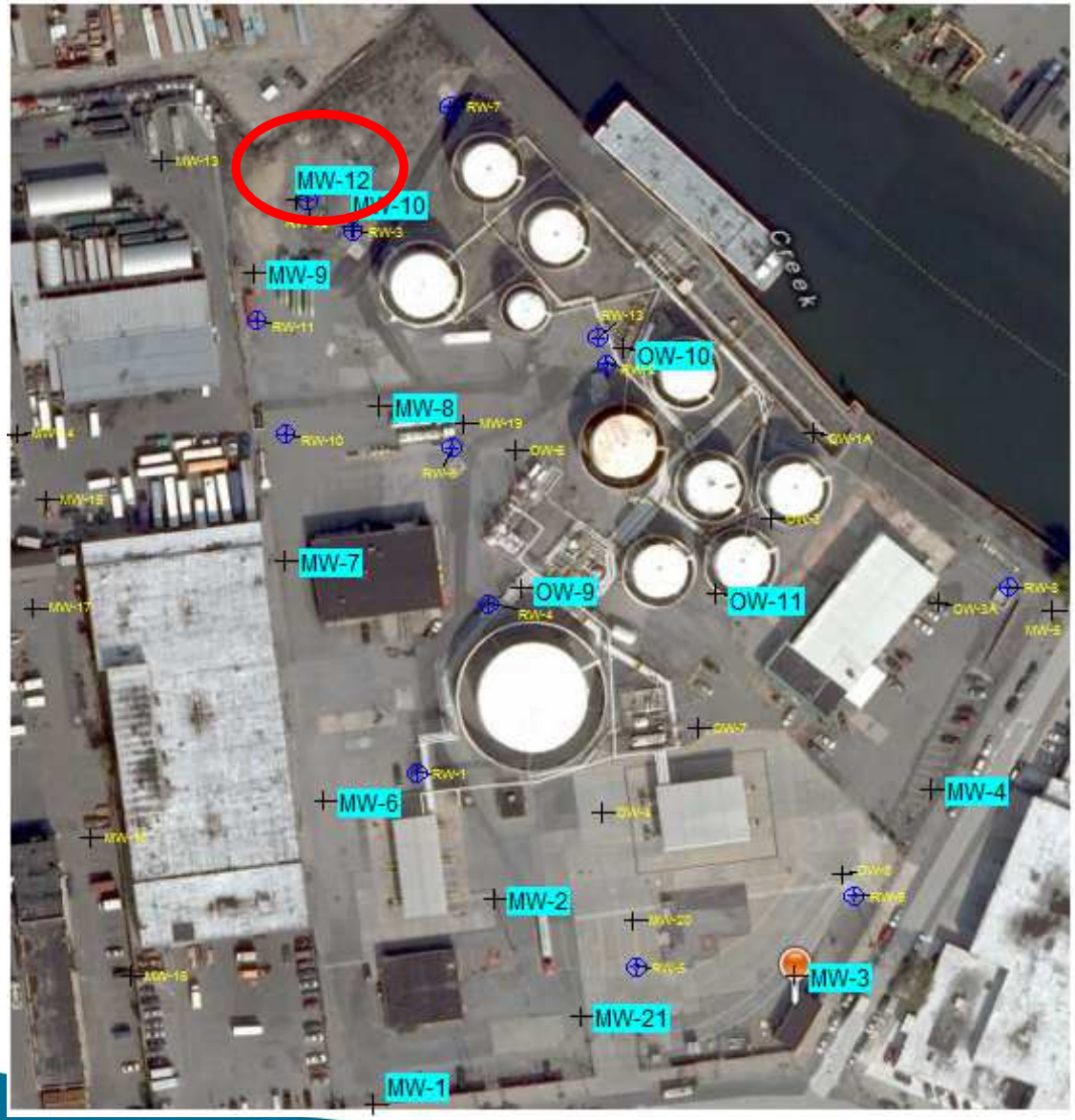
LNAPL CSM Field Data Collection



Baildown Test Well Locations

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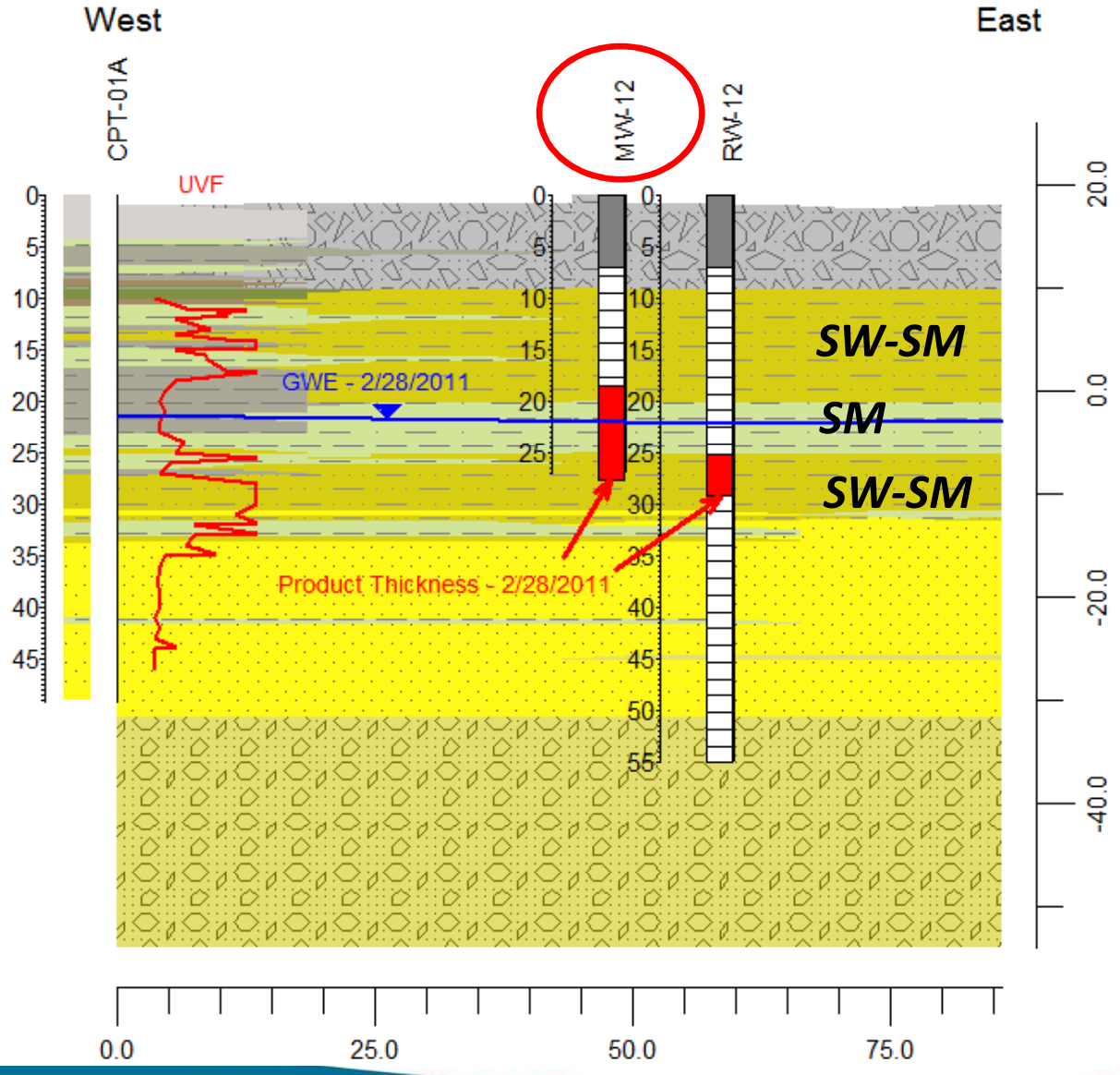
LNAPL CSM Data Analysis



Baildown Test Analysis MW-12

Perched LNAPL

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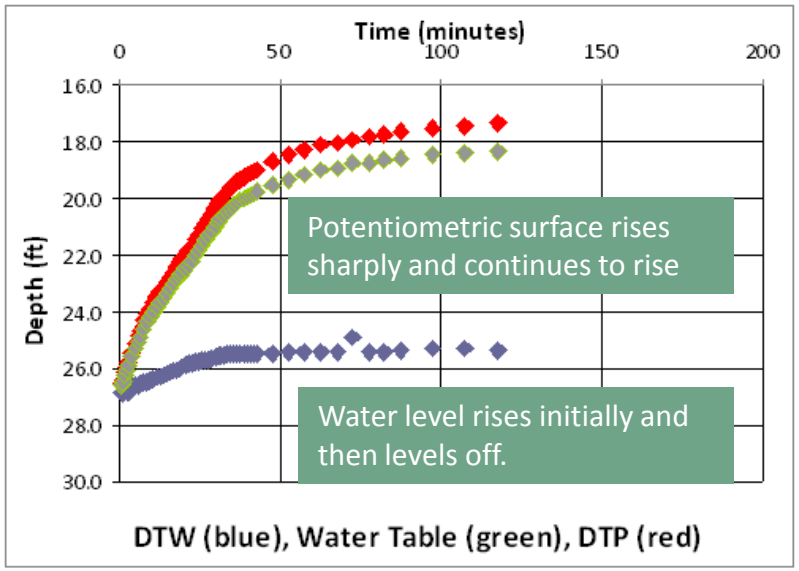
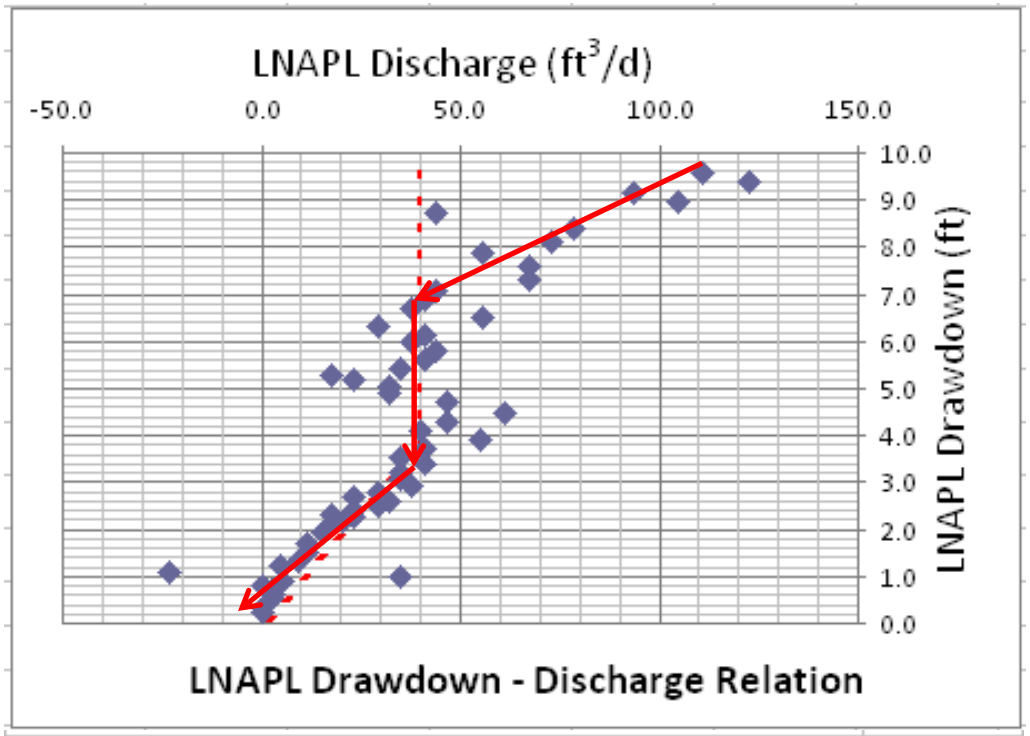
LNAPL CSM Data Analysis



Baildown Test Analysis (Perched LNAPL) MW-12



LNAPL Transmissivity, T_n (ft^2/d):	4.42

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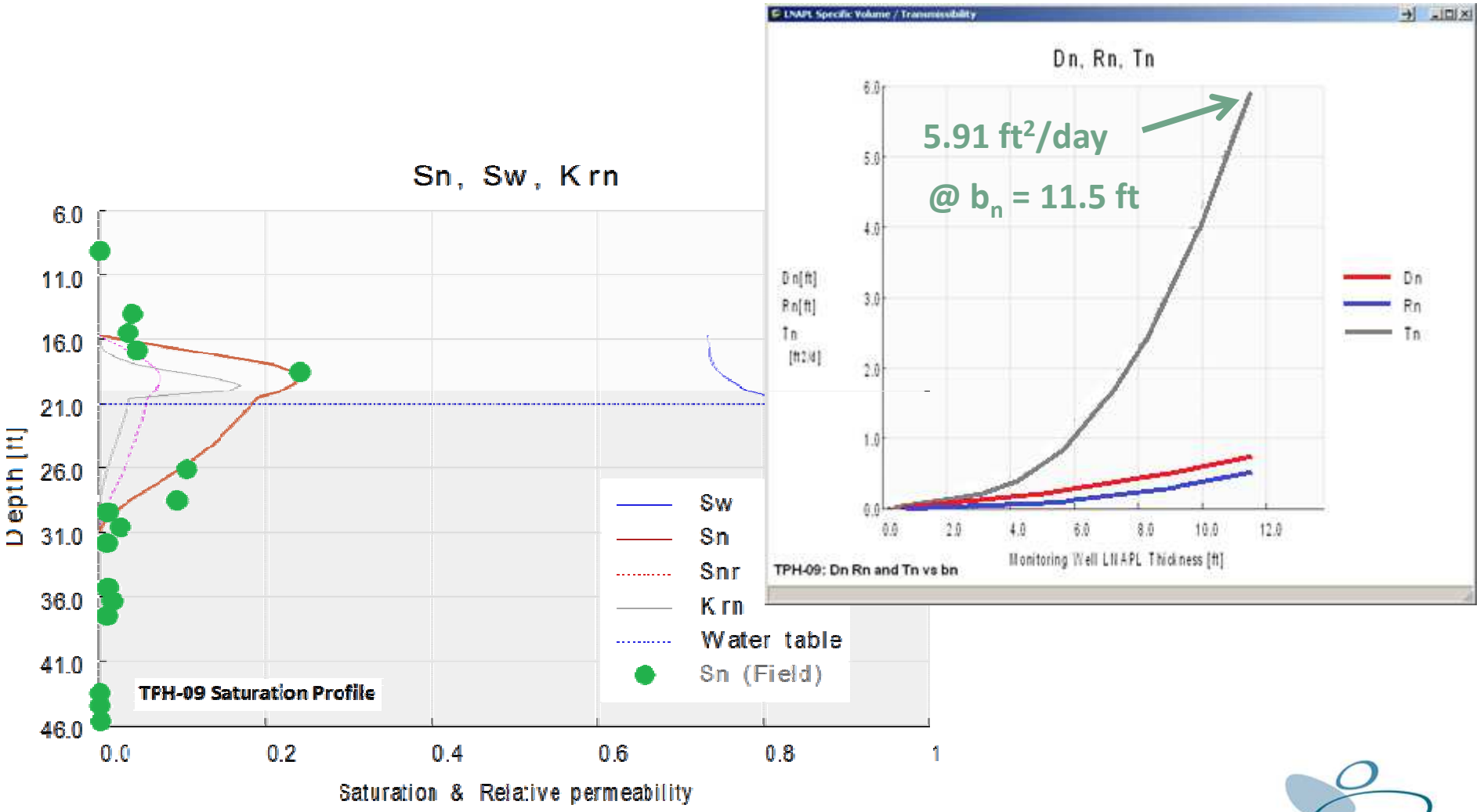
LNAPL CSM Data Analysis



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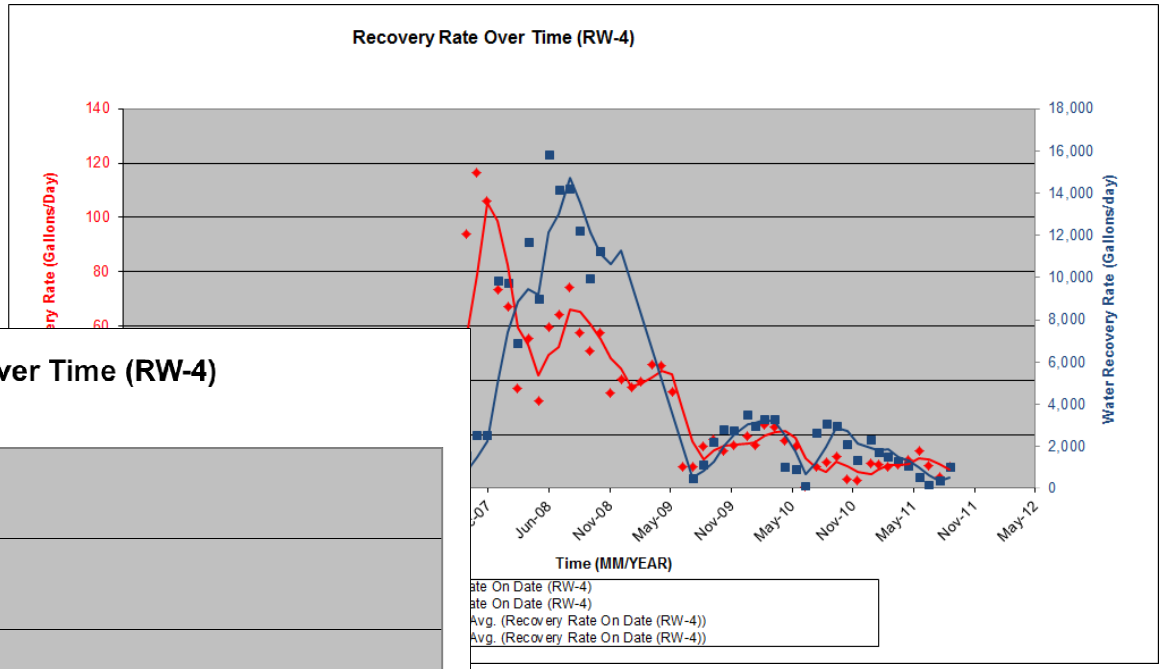
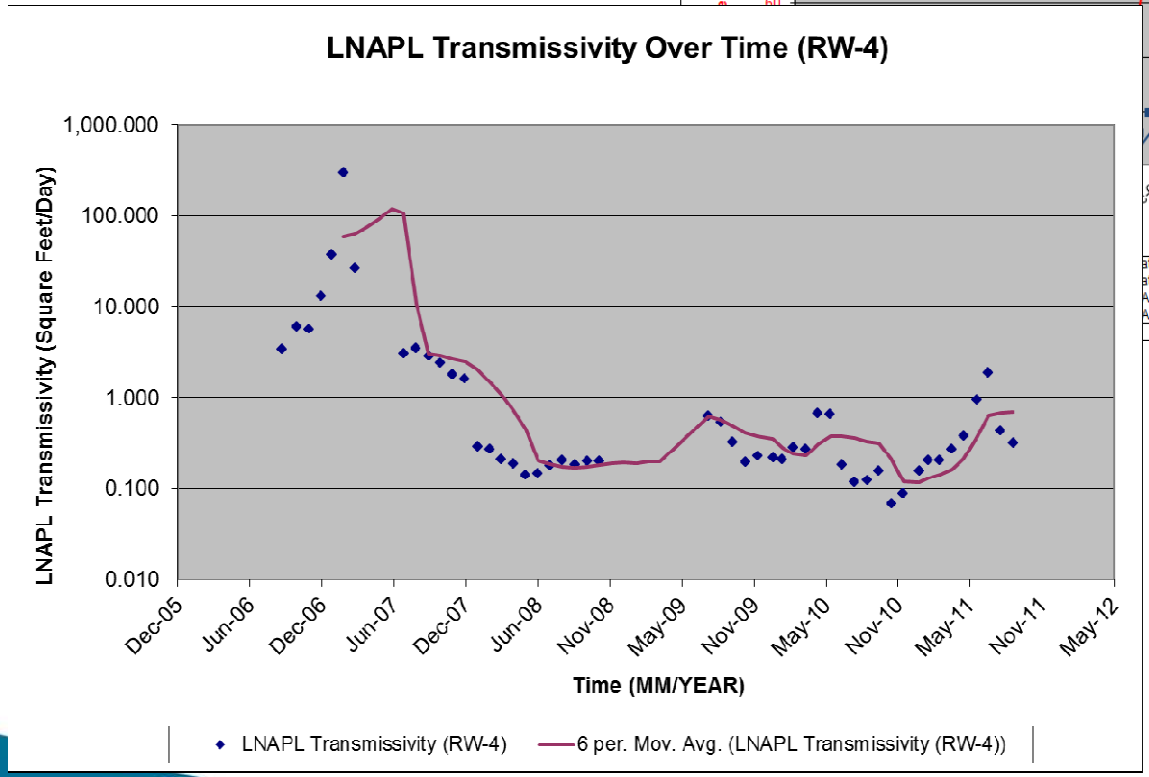
LNAPL CSM Data Analysis

$$T_n = Q_n T_w r_r / Q_w$$





LNAPL CSM Data Analysis

Distribution and Contours of Oil-specific Volume (ft^3/ft^2)

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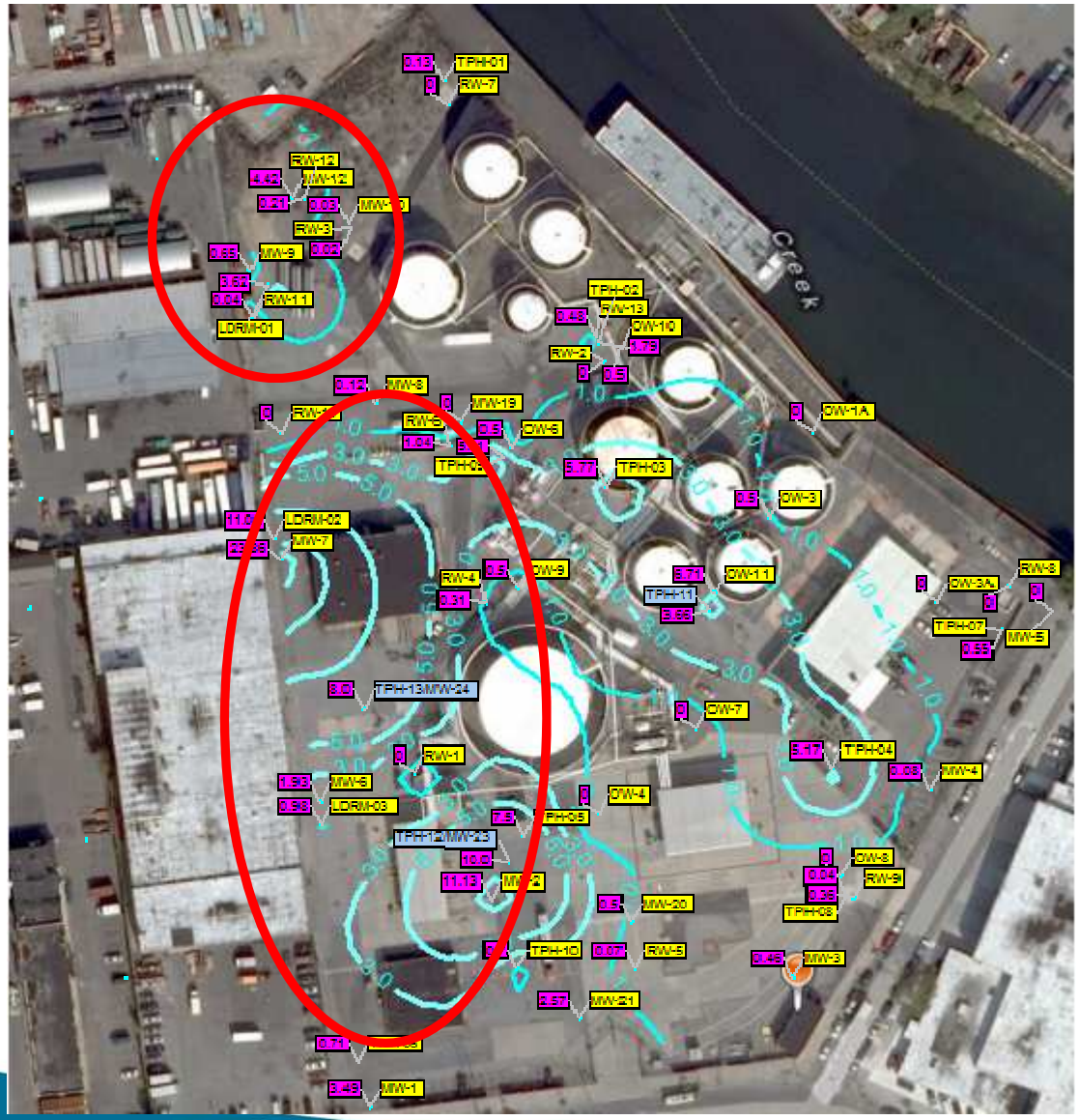
LNAPL CSM Data Presentation



Distribution and Contours of LNAPL Transmissivity (T_n)

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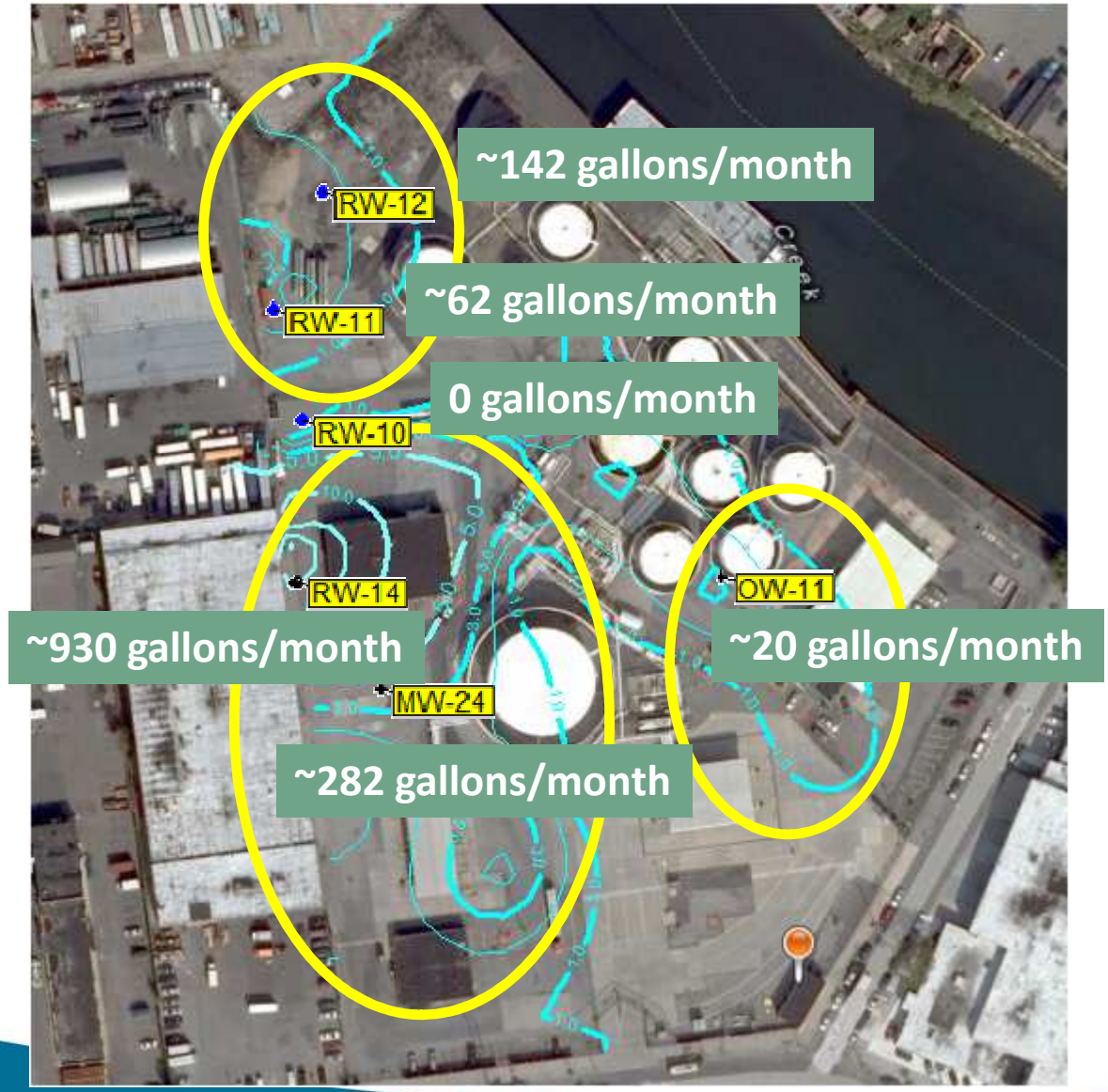
LNAPL CSM Data Presentation



Contours of T_n times OSV (ft^3/day)

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Insights

- The interfingering of the various sediments can produce **high LNAPL transmissivity** when a thin sandy unit contains a high LNAPL saturation, but this doesn't necessarily mean the yield can be sustained

- In-well thickness of LNAPL **is not a reliable predictor** of LNAPL recoverability

- Oil-specific volume **is a better measure** of estimating the actual volume of LNAPL in the ground

- Produce the most robust datasets possible using a **variety of techniques** to calculate key parameters

- Multiplying LNAPL transmissivity by the oil-specific volume produces a **new parameter for evaluating potential recoverability** that incorporates both mobility and volume.


Stop raising your hand Alligator.
You don't know the answer to my questions. You are an Alligator.