

LSPA LNAPL White Paper Recommendations

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The logo for Subsurface Environmental Solutions, LLC is located in the bottom left corner. It features a white rectangular background with a blue wave-like shape at the bottom. The text "Subsurface Environmental Solutions, LLC" is written in a serif font, with "Subsurface" on the first line, "Environmental" on the second line, and "Solutions, LLC" on the third line.

Subsurface
Environmental
Solutions, LLC

Conceptual Site Model Summary

Old Model vs. New Model

Figure 2 – Tank and Pancake Conceptual Model

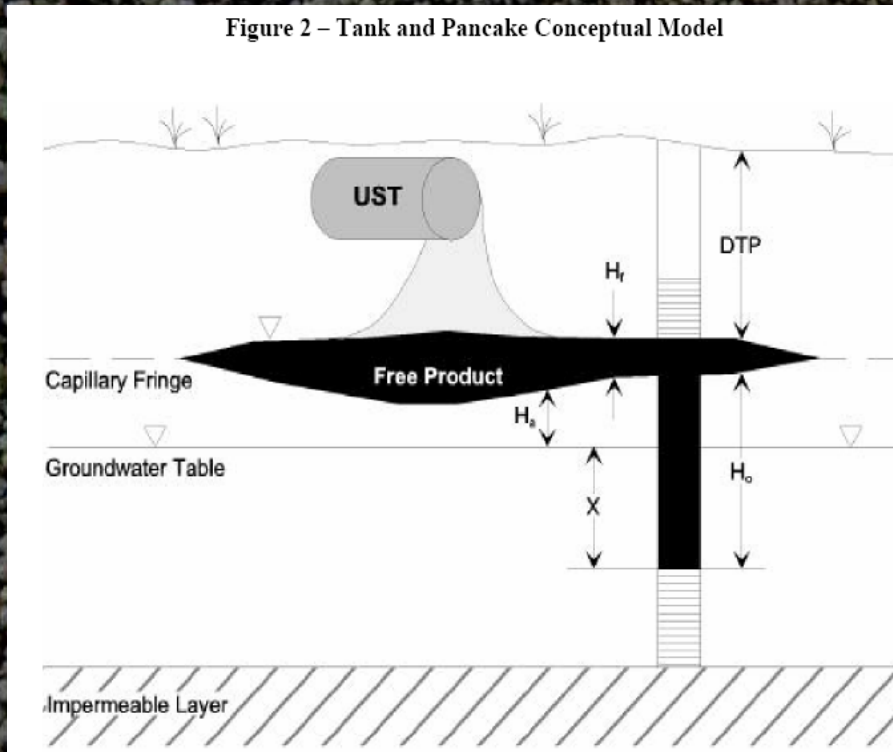
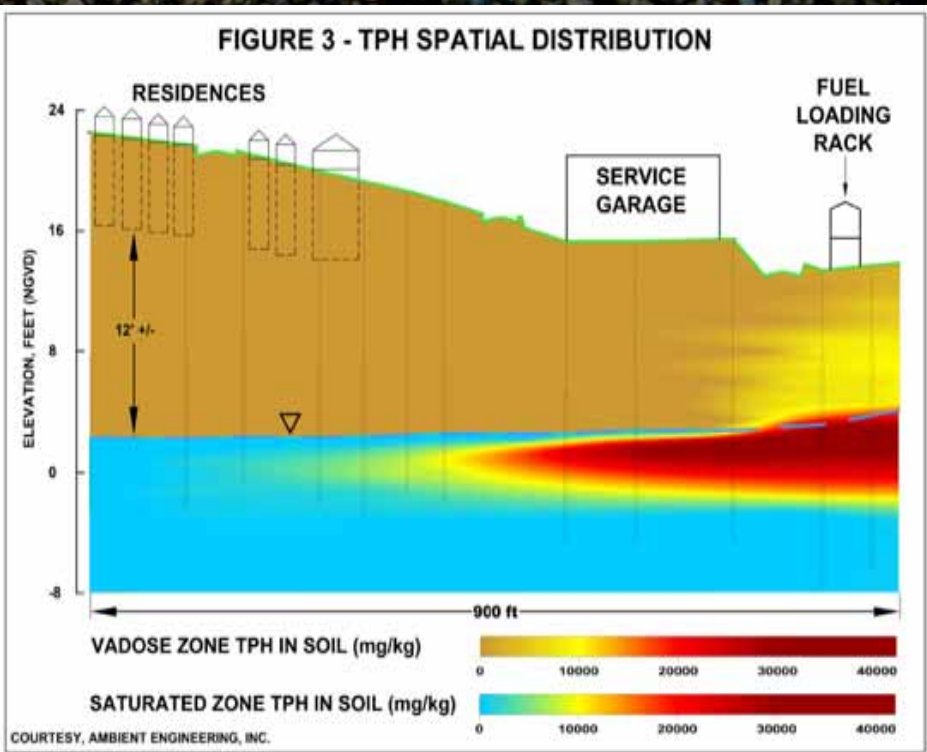
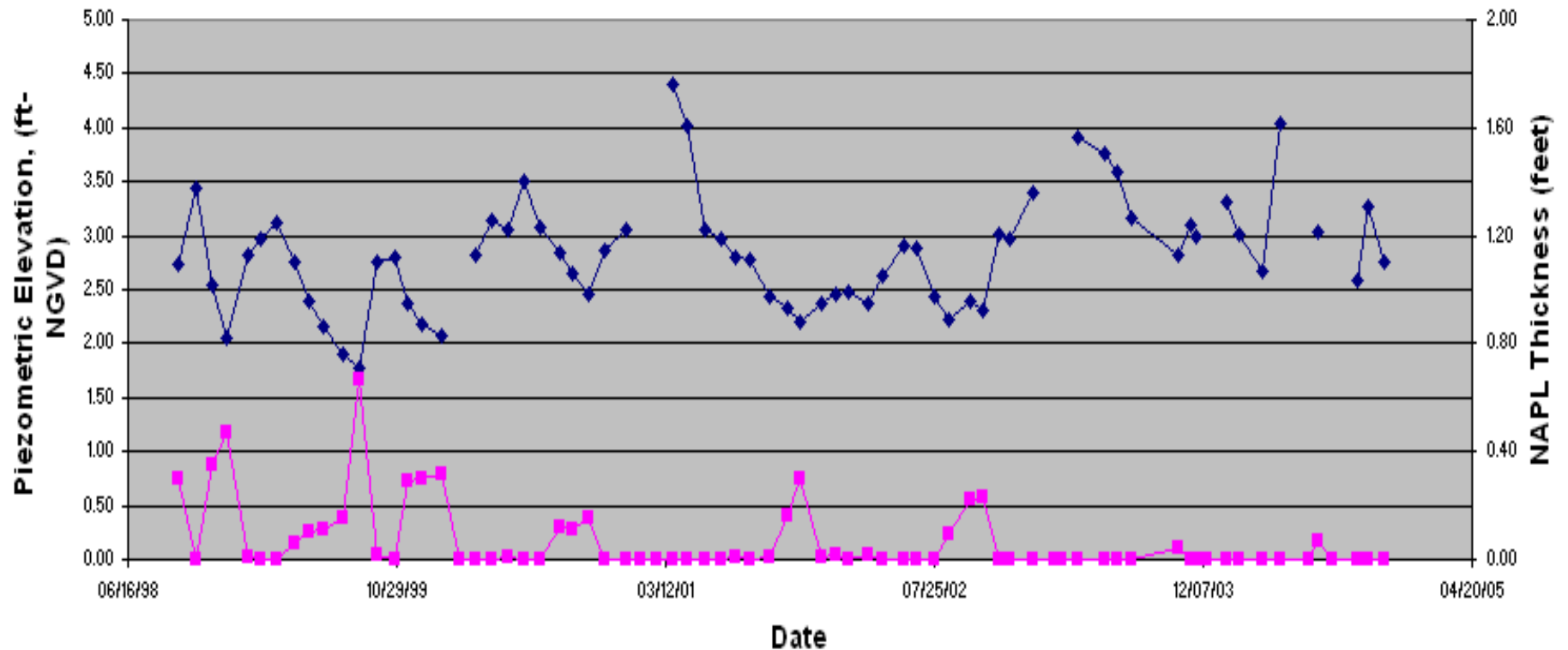


FIGURE 3 - TPH SPATIAL DISTRIBUTION



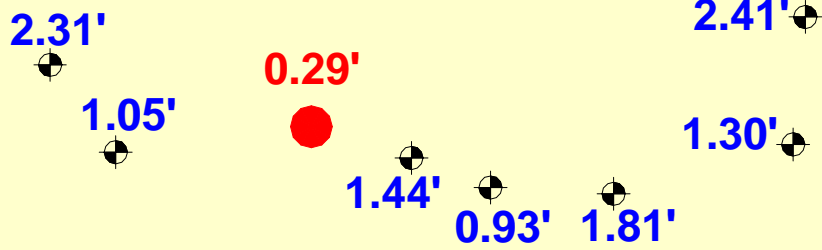
Temporal Behavior of LNAPL in a Groundwater Monitoring Well



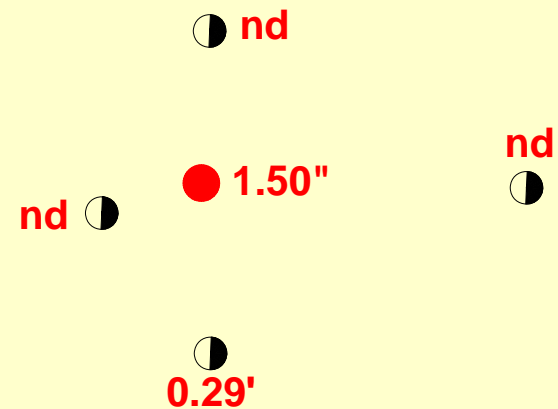
◆ Piezometric Elevation ■ Measured Product Thickness

Well Diameter Effect

8" diameter well surrounded by 2" diameter wells

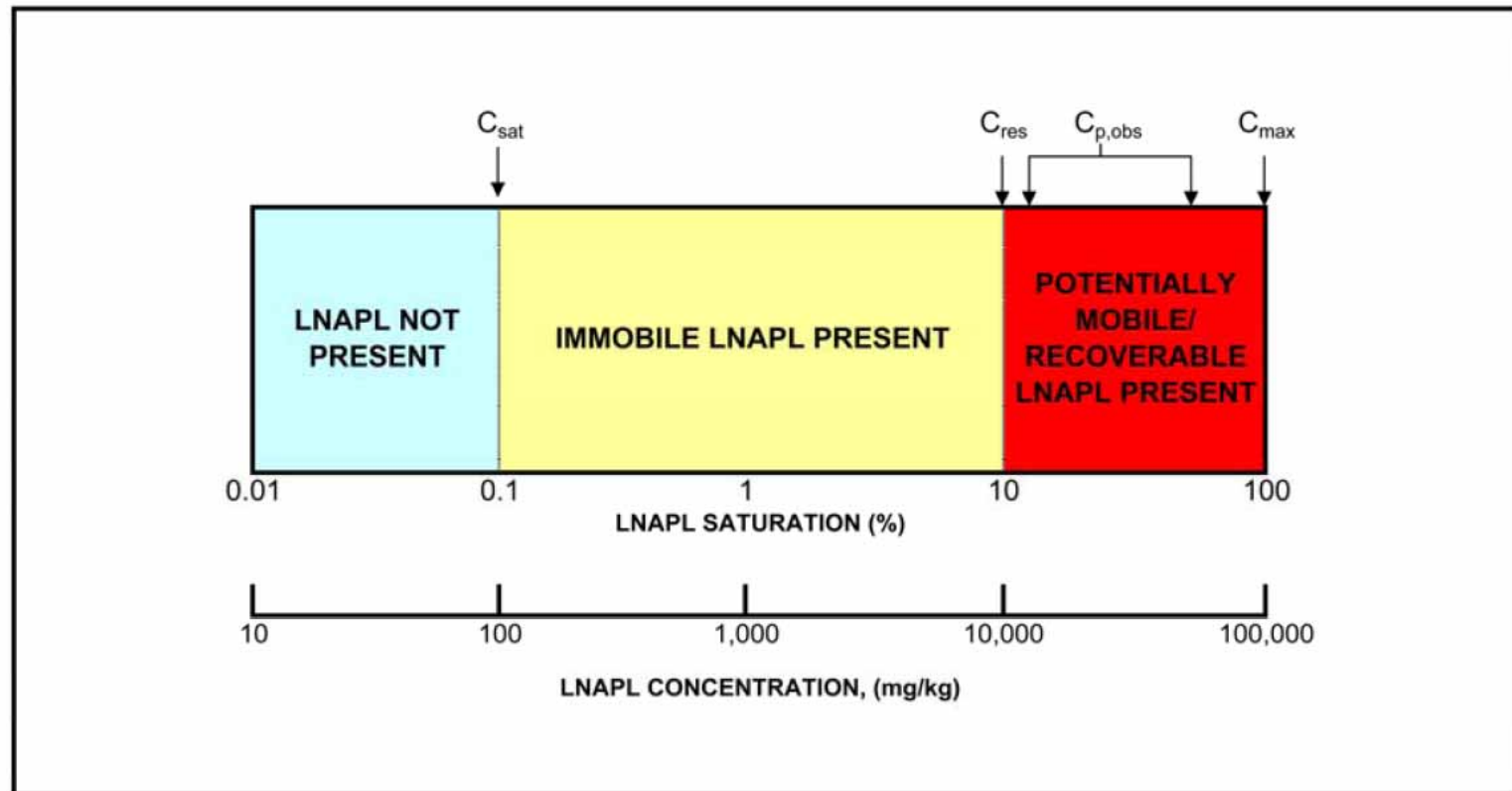


1" diameter well surrounded by 2" diameter wells



LNAPL CHARACTERIZATION FRAMEWORK

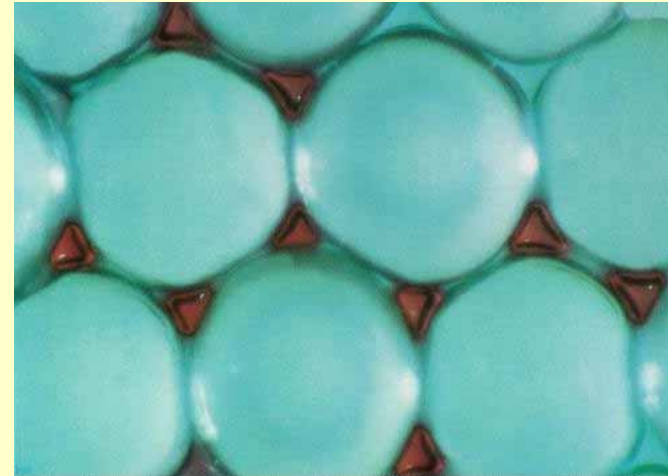
Figure 1 – The LNAPL Continuum



DEFINITION OF NAPL

CURRENT DEFINITION

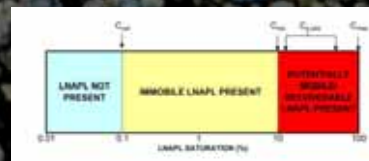
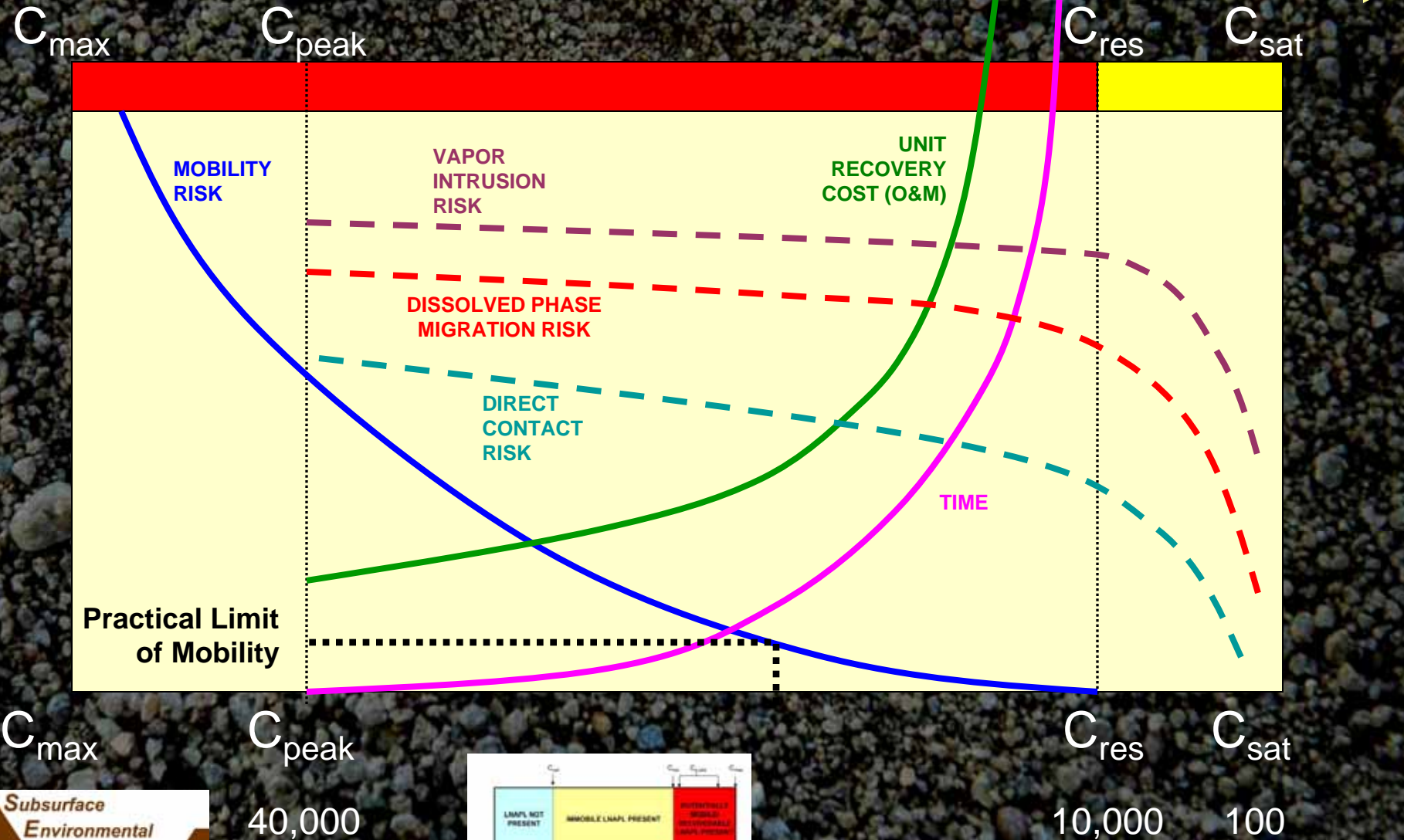
Nonaqueous Phase Liquid and *NAPL* each means oil and/or hazardous material that is present in the environment as a *continuous separate phase as measured in a groundwater monitoring well or otherwise observed in the environment.* (310 CMR 40.0006).



PROPOSED DEFINITION

Nonaqueous Phase Liquid and *NAPL* each means oil and/or hazardous material, or a mixture thereof, that is present in the environment as a *separate non-gaseous phase liquid, that is relatively immiscible with water.*

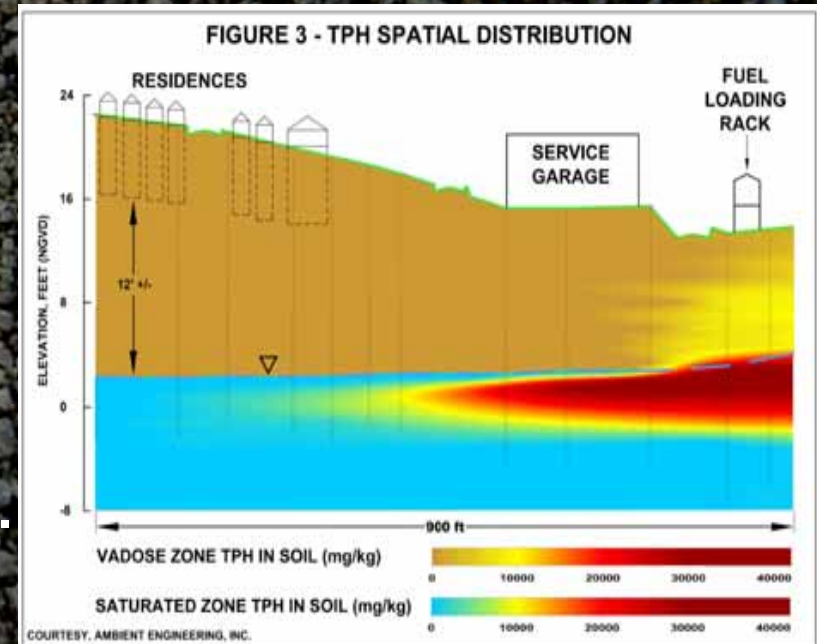
Should We Try to Recover to the Maximum Extent Practicable?



LSPA Recommendations

Regulatory Change Recommendations

- New definition for LNAPL ($>C_{\text{sat}}$)
- Definition for Secondary LNAPL Source
- Eliminate ½-inch UCL
- Streamline reporting condition for LNAPL in a monitoring well. Suggest 72-hour condition for LNAPL > 0.01 feet.



Risk Assessment

Direct Contact Risk Characterization Scenarios for Petroleum Hydrocarbons

Petroleum Hydrocarbons	Method 1 Standards Concentration (mg/kg)			
	S-1/ GW-1/GW-2/GW-3*	Basis**	S-3/ GW-1/GW-2/GW-3*	Basis**
VPH				
C5-C8 Aliphatics	100	Ceiling (low)	500	High volatility
C9-C12 Aliphatics	1,000	Ceiling (high)	5,000	Ceiling (high)
C9-C10 Aromatics	100	Ceiling (low)	300/500/500	High volatility
EPH				
C9-C18 Aliphatics	1,000	Ceiling (high)	5,000	Ceiling (high)
C19-C36 Aliphatics	3,000	Ceiling (high)	5,000	Ceiling (high)
C11-C22 Aromatics	1,000	Ceiling (high)	1,000/5,000/5,000	Ceiling (high)
TOTAL VPH/EPH Conc.	6,200		16,800 (GW-1) 21,000 (GW-2/GW-3)	

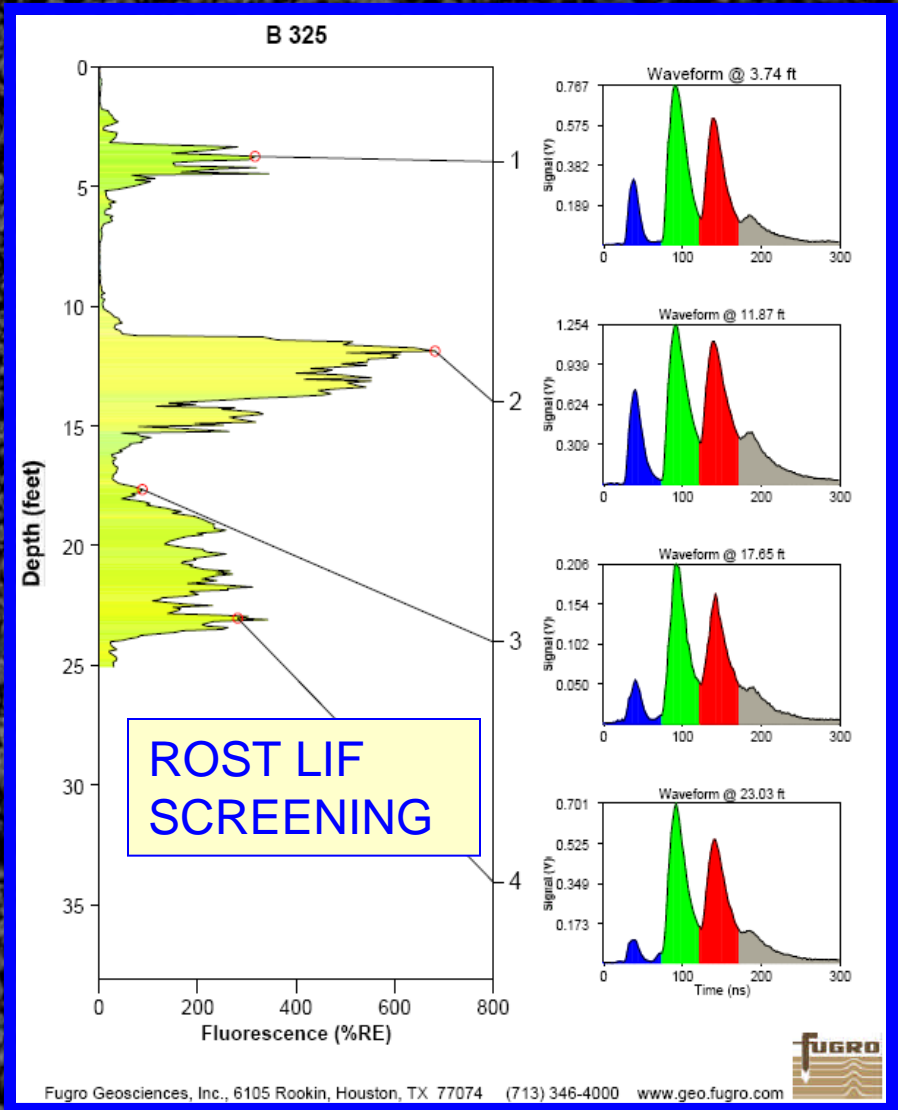
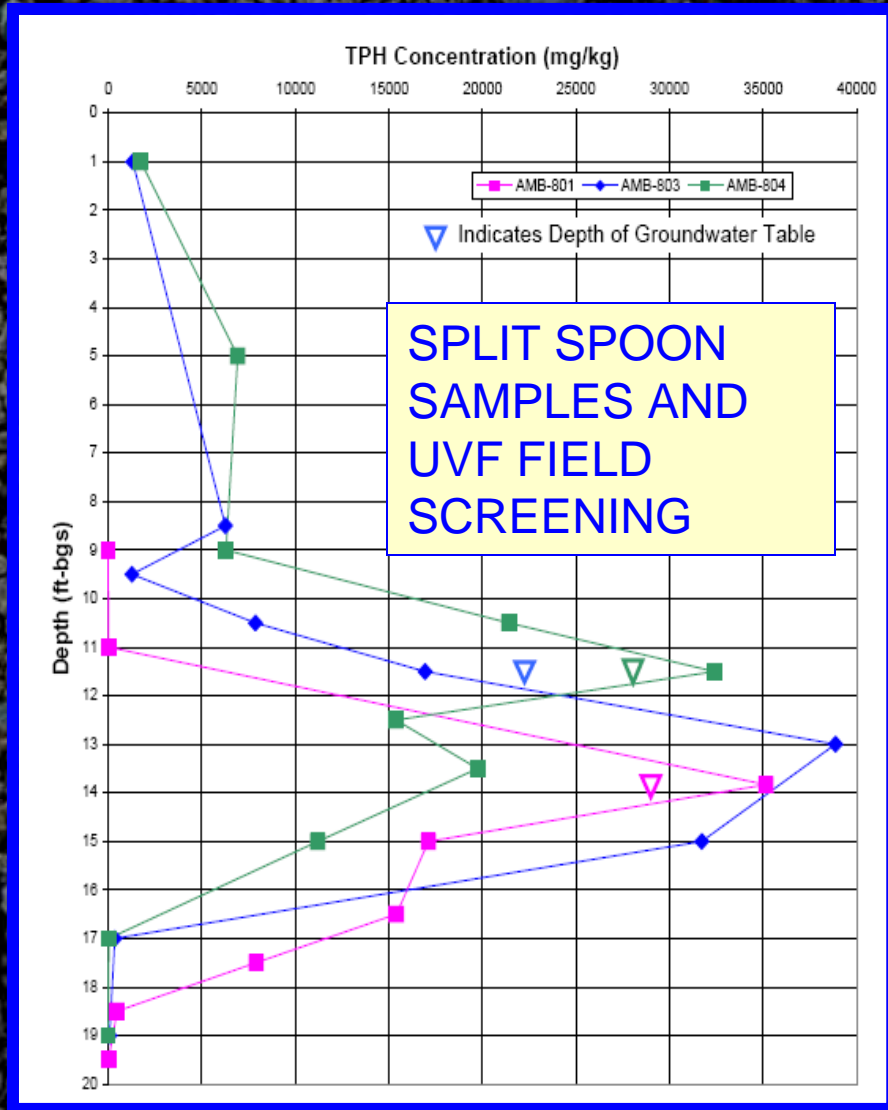
* Standard is the same for each groundwater category, unless otherwise noted.

** Ceiling (low and high) based on the odor index and volatility of the chemicals.

Risk Assessment

- Evaluate current risk using existing MCP risk assessment protocols
- Evaluate soil vapor risk by collecting and testing soil vapor samples above LNAPL
- Use vertical profile data to calculate exposure point concentrations (direct contact, ingestion and construction worker inhalation/ingestion)

VERTICAL PROFILES



Risk Assessment Recommendations (continued)

- Construction worker exposure to particulates addressed in accordance with “Characterization of Risks Due to Inhalation of Particulates by Construction Workers” (DEP, 2002).
- Additional guidance sought from MassDEP regarding WDAF’s and ESIR’s