

CONSULTANTS' DAY 2015

20th Anniversary

DNR's
Remediation
& Redevelopment
Program

Site Investigations: Common Mistakes and Helpful Hints

Soil – Groundwater – NAPL / NR 716

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Wisconsin DNR



Hosted by DNR's
Remediation & Redevelopment Program



Key Points



- Easier closure decisions for simple sites, including excavation remedies,
- Reduced long-term costs (delay/re-work),
- Improved site conceptual models, particularly for complex sites, and
- Reminder: absences on Closure Forms require meaningful explanations.

Subject Media



- Part 1: {
- Vadose Zone Soils - including fill
 - GW Aquifers – including aquifer matrix
 - Non-Aqueous Phase Liquids (NAPLs)
- Part 2: Vadose Zone - vapor phase
(Presentation B – Part 2)

Vadose Zone – Problems



- All potential sources not identified/sampled,
- All potential contaminants of concern not evaluated, including fill,
- Direct contact risk evaluations not complete,
- Extent incompletely defined, including off-site,

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Vadose Zone – Problems



- Poorly constructed or incomplete cross sections,
- Less than clear post-excavation results, and
- Failure to identify structural impediments.

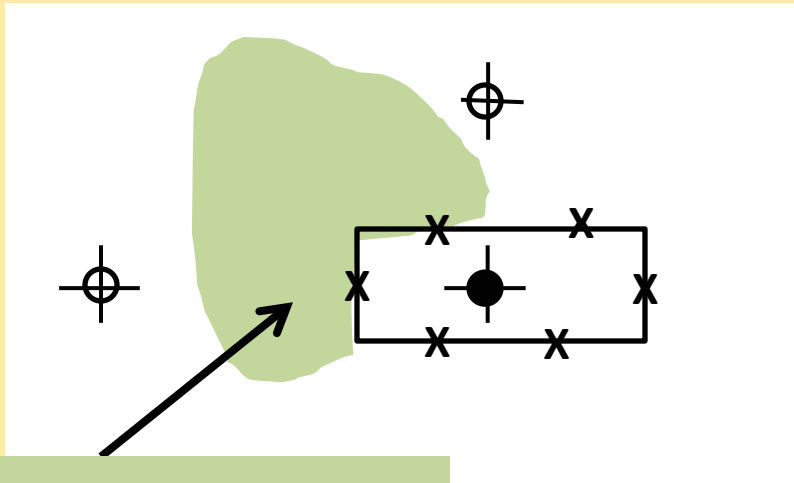
Vadose Zone – More Data



Benefits:

- Better fill characterization,
- Needed for background and statistical determinations,
- Better definition of VI risk, and
- Better definition of DC risk, particularly for contaminants w/o viable field indicators.

Vadose Zone Soils

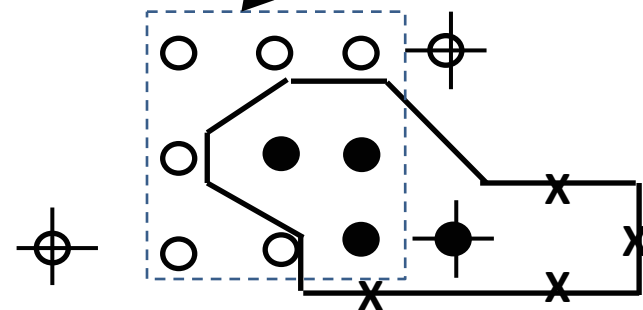


Post-Excavation
Remaining DC risk
(re-do, likely)

Shallow Excavation:

DC risk - no field indicators

Additional Grid
of Sample Points



⊕ Boring w/no exceedance

● Boring w/exceedance

X Confirmation Sidewalls

GW Aquifer – Problems



- Lateral/vertical extent of plume not defined,
- All contaminants of concern not evaluated,
- Range of lateral GW flow direction not illustrated,
- Vertical gradients not determined,
- Aquifer matrix sampling limited,

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GW Aquifers - Problems



- Hydraulic conductivities (HC) not measured or improperly evaluated,
- Discounting data w/o adequate justification,
- Iso-concentration maps missing; relying on ES/PAL (closure) maps,
- Poor flow interpretations, and
- NA contaminant trends not adequately evaluated; variability needs to be qualified.

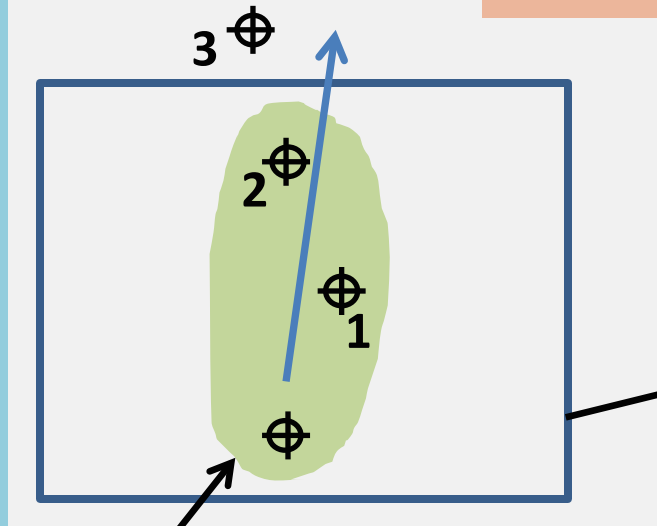
GW Aquifers - Piezometers



- Locate downgradient of source,
- Evaluate vertical gradients, including 3-D vector analysis, and
- HC needed considering limitations of aquifer matrix sampling - consider transducers/data loggers.

GW Aquifers

Submitted Plume Map



Source Area

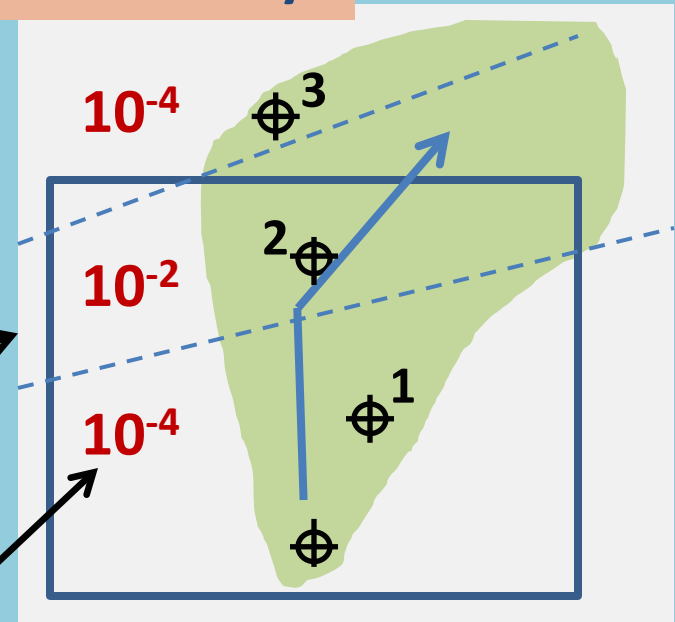
Property Boundary

Conundrum:

#3 w/ND-5X ES

#2 w/200-400X ES

More Likely



Axis of buried bedrock valley

HC (cm/s)

LNAPL - Problems



- Over reliance on measured well thicknesses,
- GWL vs. LNAPL thickness plots missing,
- Recognition of LNAPL below water table,
- Interim/remedial actions for historical sites:
 - LNAPL bailing
 - passive collectors
 - vacuum truck extraction

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LNAPL - Problems



- LNAPL transmissivity not measured, and
- Laser Induced Fluorescence (LIF) survey needed or inadequately evaluated,

DNAPL



Prior comments concerning improved aquifer matrix characterization and HC measures.

Why?

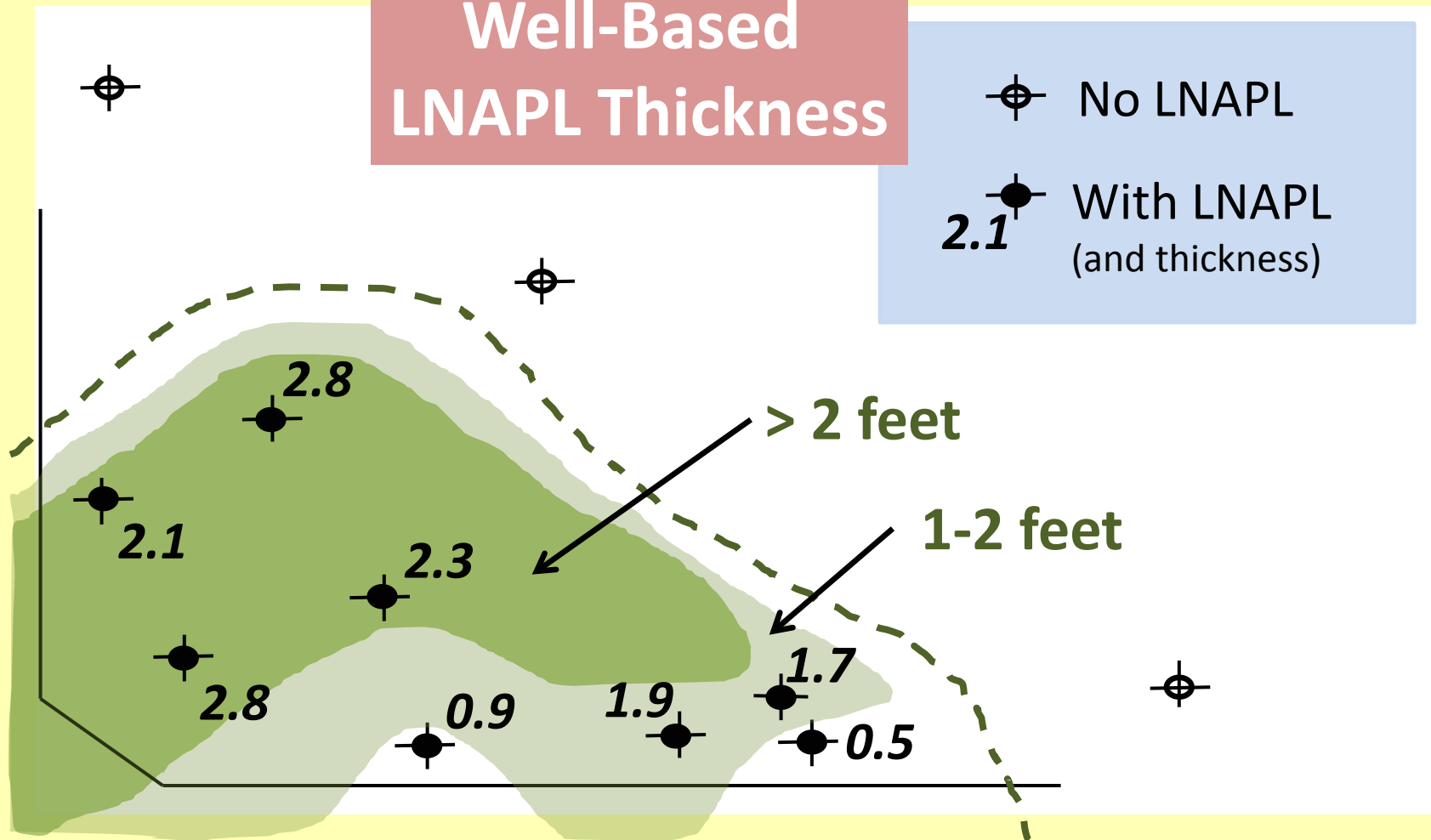
Downward flowing DNAPL will flow laterally along the top of low conductivity intervals.

LNAPL

Well-Based LNAPL Thickness

⊕ No LNAPL

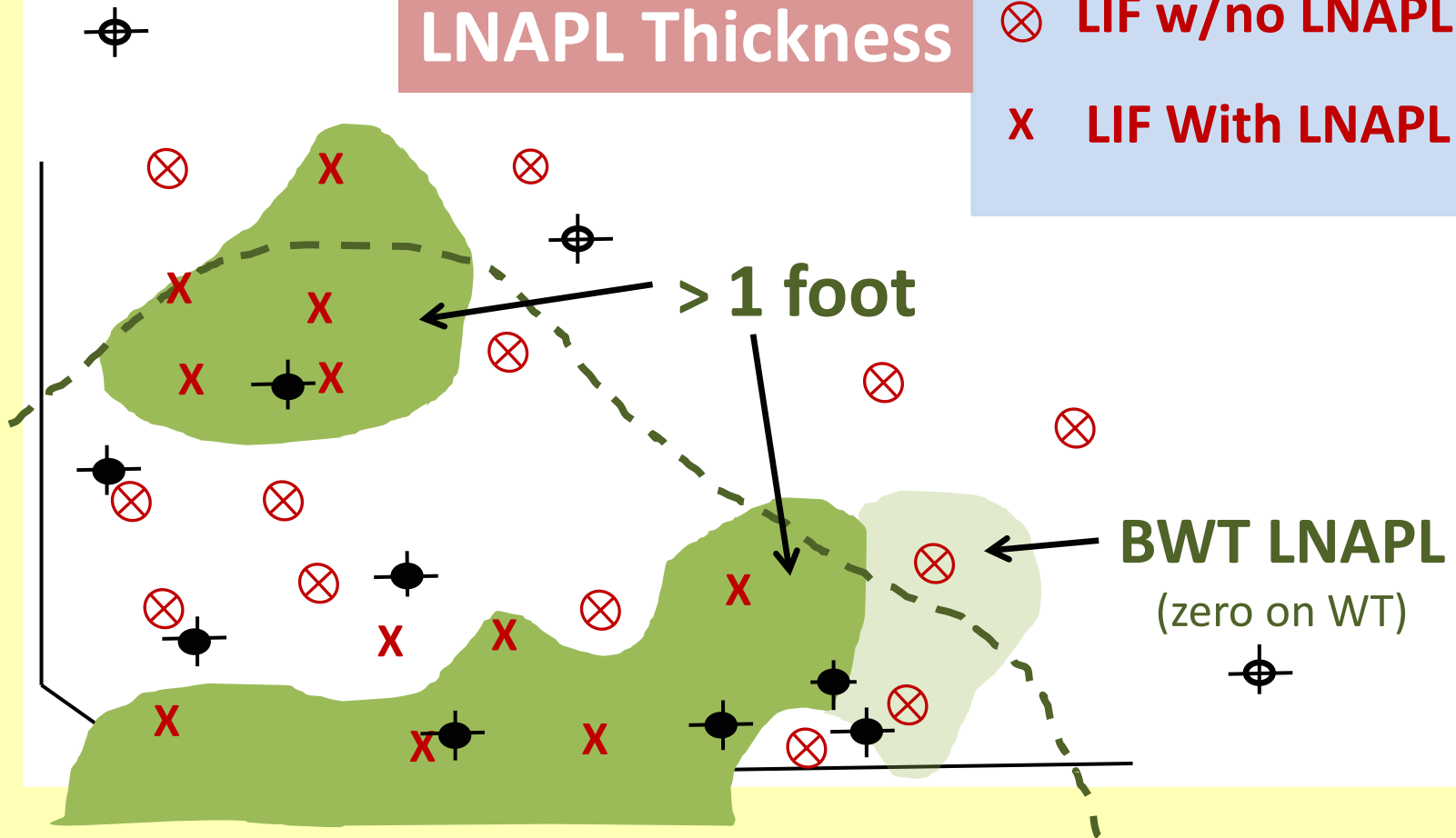
2.1 ⊕ With LNAPL
(and thickness)



LNAPL

LIF-Based LNAPL Thickness

- ⊗ LIF w/no LNAPL
- X LIF With LNAPL



Summary of Key Points



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**Thank you for attending
Consultants' Day**

