Complex Site Management – Wyckoff Wood Treater –EPA R. X

FRTR Meeting May 2014 – Jim Cummings TIFSD/OSWER/USEPA

Site History

- Creosote Wood treating began in 1904, ended 1988
- One of largest wood treating facilities in the U.S.
- Initially, poles treated by wrapping with burlap and asphalt
- By 1910, pressure treatment with creosote / bunker oil
- Wood also treated with pentacholorphenol

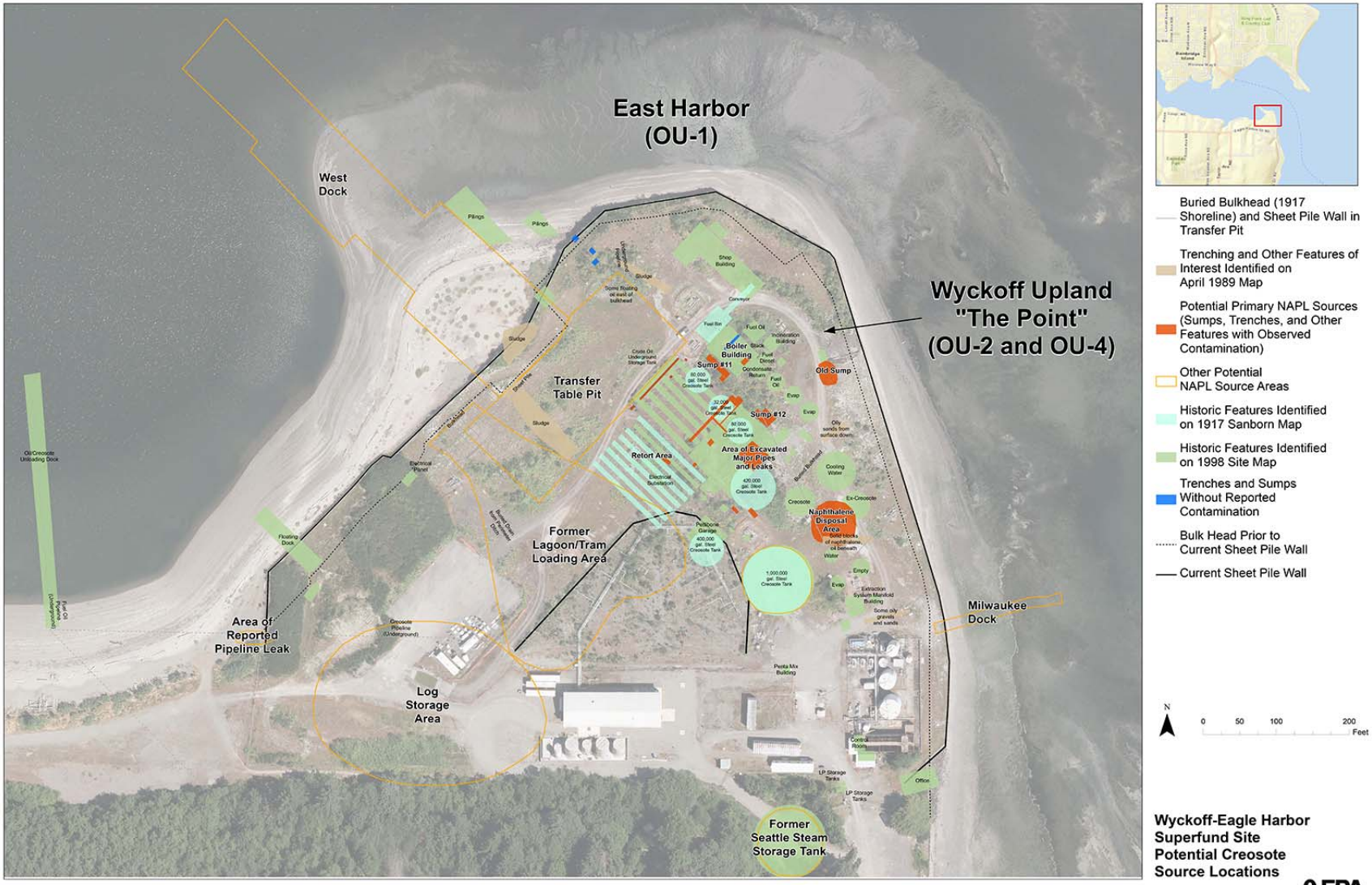
West Coast Wood Preserving Company ~1940

Wyckoff Facility Viewed From Ferry

Wyckoff Facility in Operation

DNAPL (Beyond ‘Sheen’) On the Beach

Wyckoff Upland Source Areas



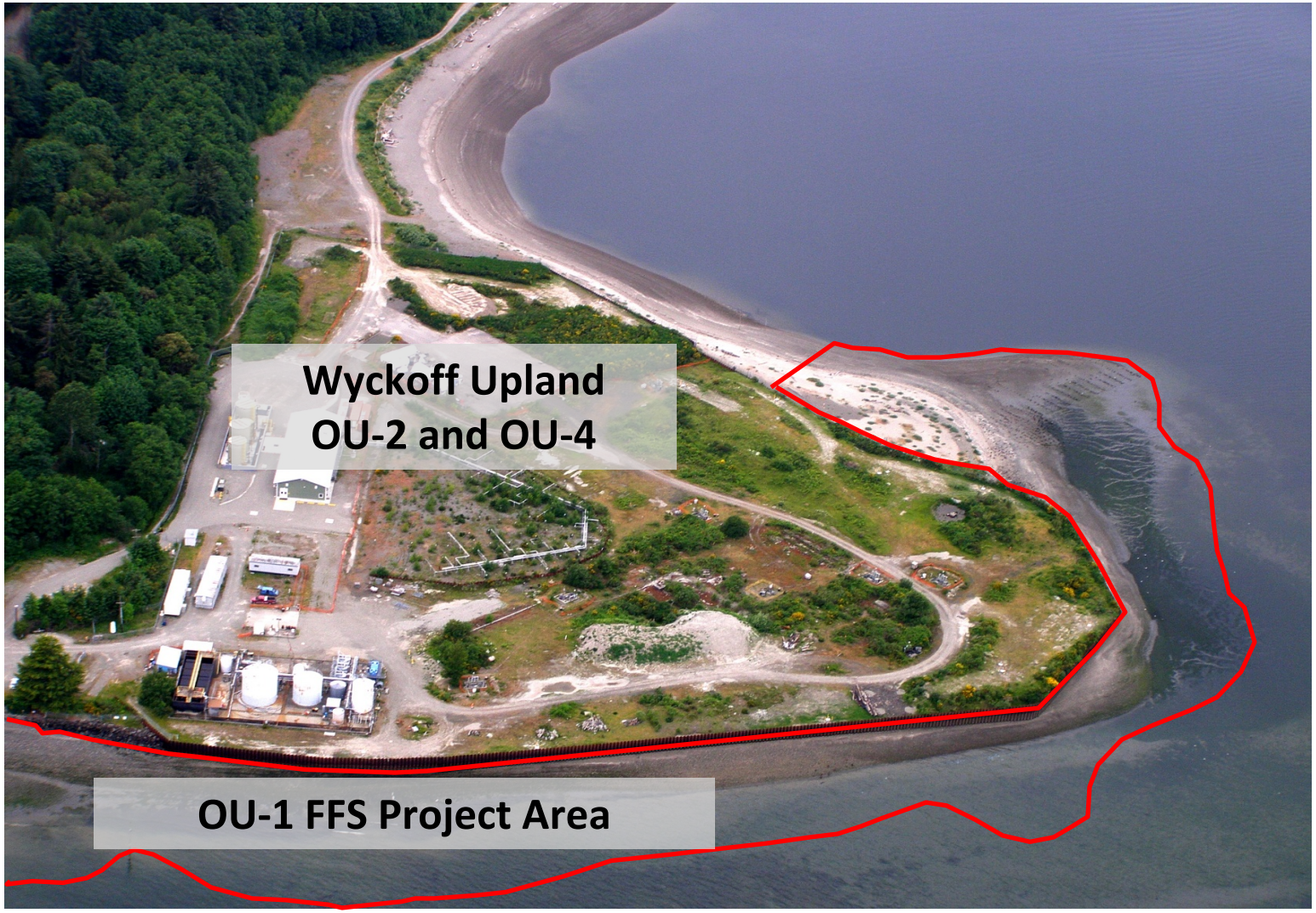
Wyckoff-Eagle Harbor Superfund Site
Potential Creosote Source Locations

EPA

Site Administrative History

- 1971 – EPA investigated report of oil on the beach
- 1984 – Unilateral Administrative Order under RCRA issued to Wyckoff Company requiring environmental investigation
- 1984 – Ecology issued order requiring control of stormwater
- 1987 – Site added to the Superfund List
- 1987 – EPA completed Remedial Investigation
- 1994 – Settlement with Pacific Sound Resources for CERCLA liability and Natural Resource Damages

Wyckoff Upland and Intertidal Setting



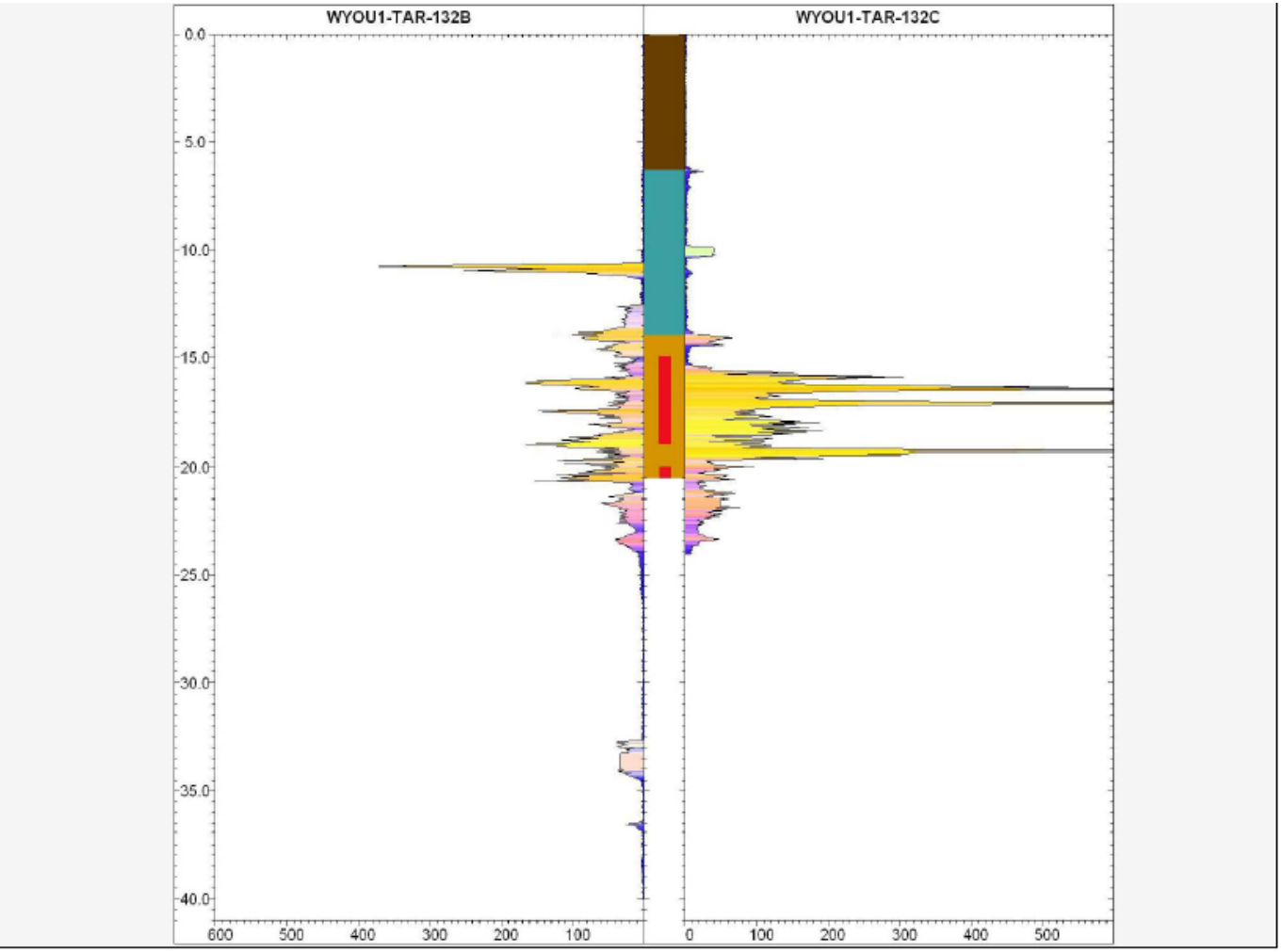
OU-1 FFS Project Area – East Beach

Low Tide

Incoming Tide

TarGOST Laser-Induced Fluorescence NAPL Investigation Method

TarGOST Response and Sediment Logs



Sediment Geologic Units

- Marine Sand and Gravel
- Gravel Zone
- Surficial Marine Sediment
- Marine Silt
- Marine Sand
- Wood Pulp and Wood Fragments
- Fill
- NAPL Occurence **(observed)**

TarGOST and Sediment Core Depths:

Tar-132B	40.0'
Tar-132C	24.0'
DP-132	20.05'

Figure 3-2
TarGOST Buttefly Logs 132B/132C and Comparative Sediment Core

EPA

Recent Site Activities

- ROD selected Steam Enhanced Extraction (SEE), contingent upon completion of pilot study
  - Problematic pilot study – design flaws resulted in naphthalene crystallizing out in piping and heat exchangers

- Region X subsequently proposed a containment remedy
  - cap
  - pump and treat system – operational
  - sheet pile wall – installed

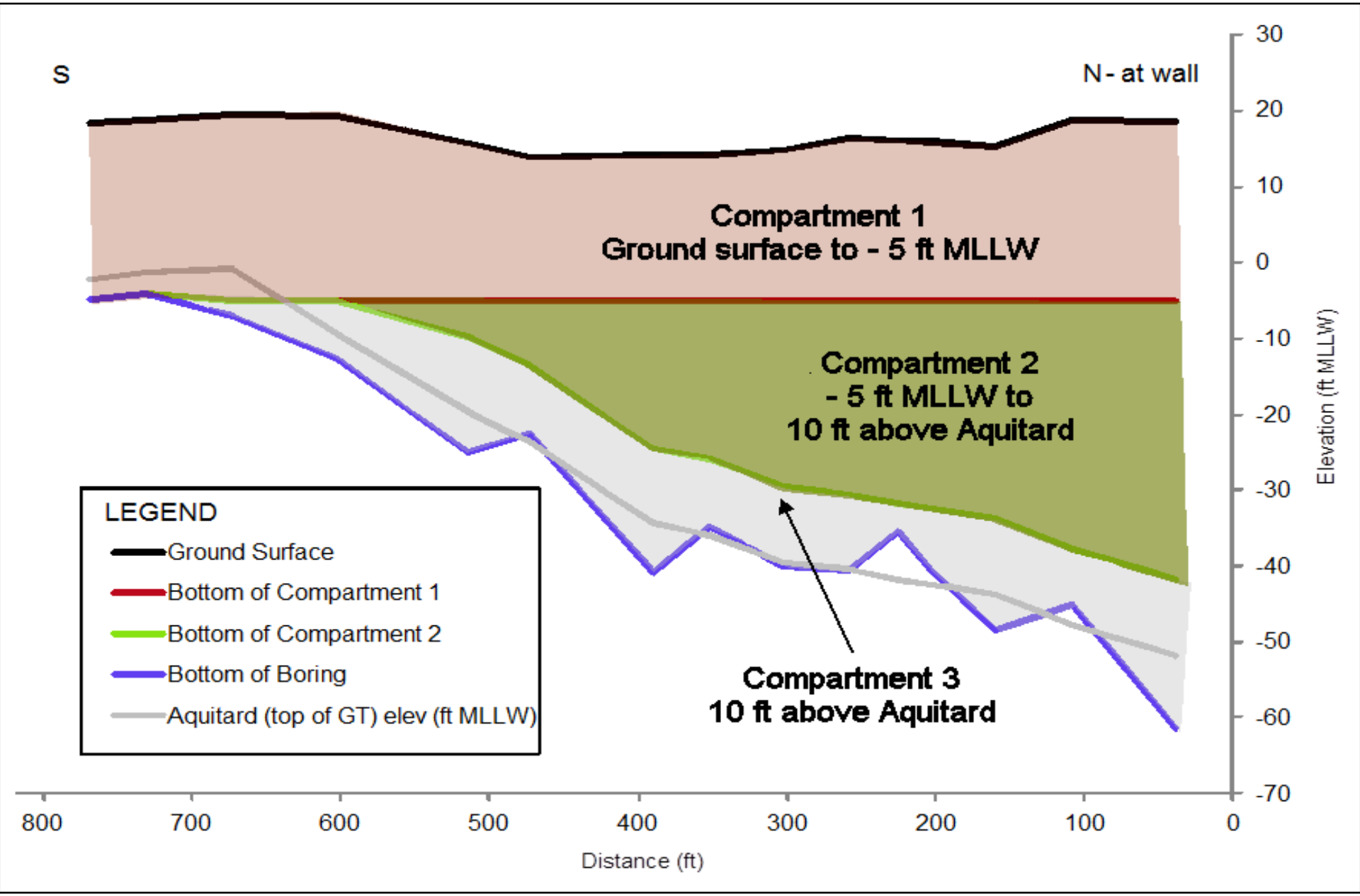
- State non-concurred, Submitted ‘Generational Remedy’ Report
  - Mostly thermal remedies
  - Not the first state to be reluctant to undertake perpetual care

Components of Site Management Strategy

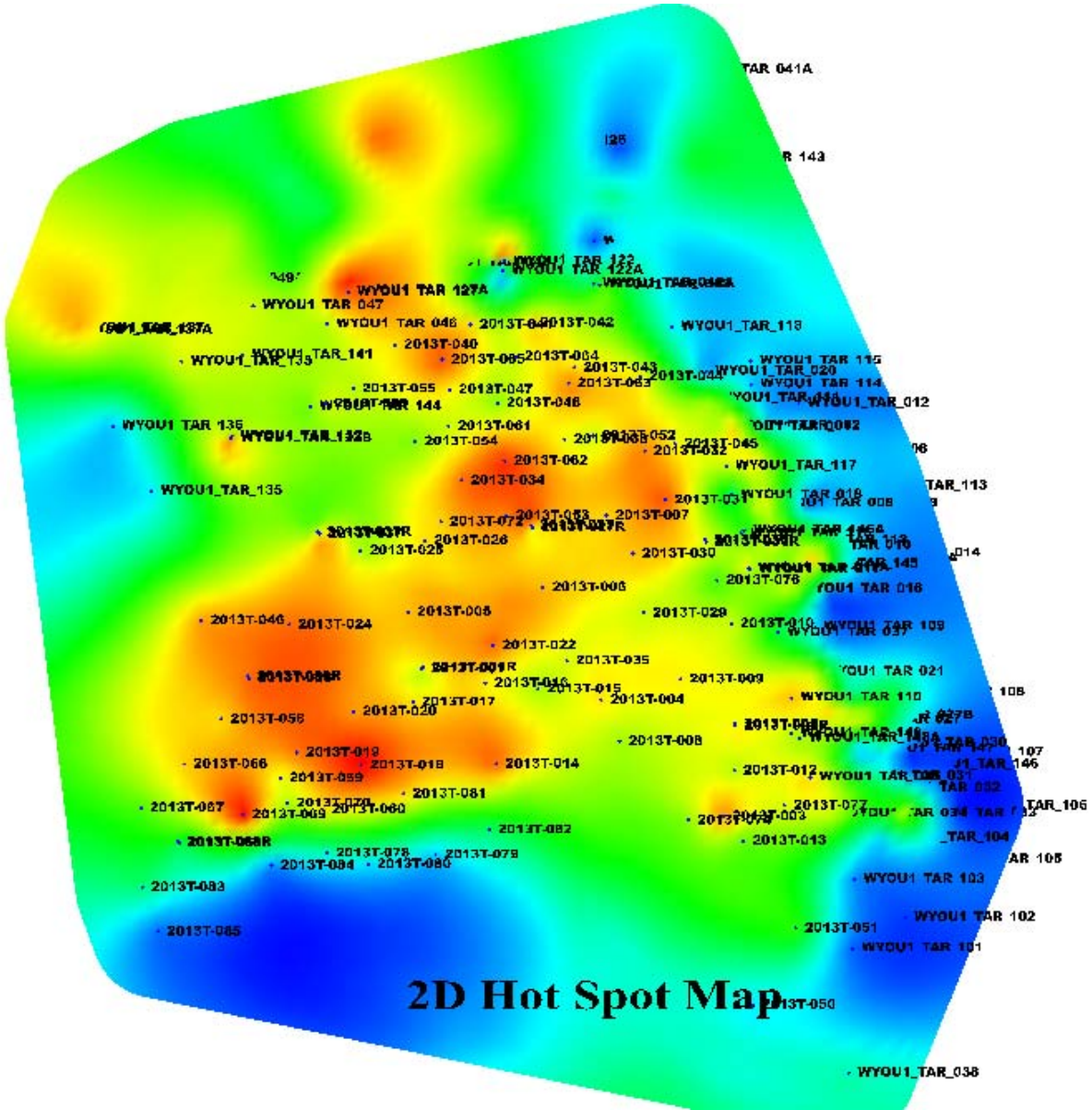
- Revise Conceptual Site Model
  - ‘True’ ‘Nature and Extent’ of viscous PAH contamination
- Time
  - ‘Reasonably time frame’ ⇔ ‘Generational Remedy’
- Expand scope of Focused Feasibility Study (FFS)
  - Flexible, adaptive use of combination of aggressive source zone technologies w/ subsequent polishing step(s)

Conceptual Site Model (CSM) Update

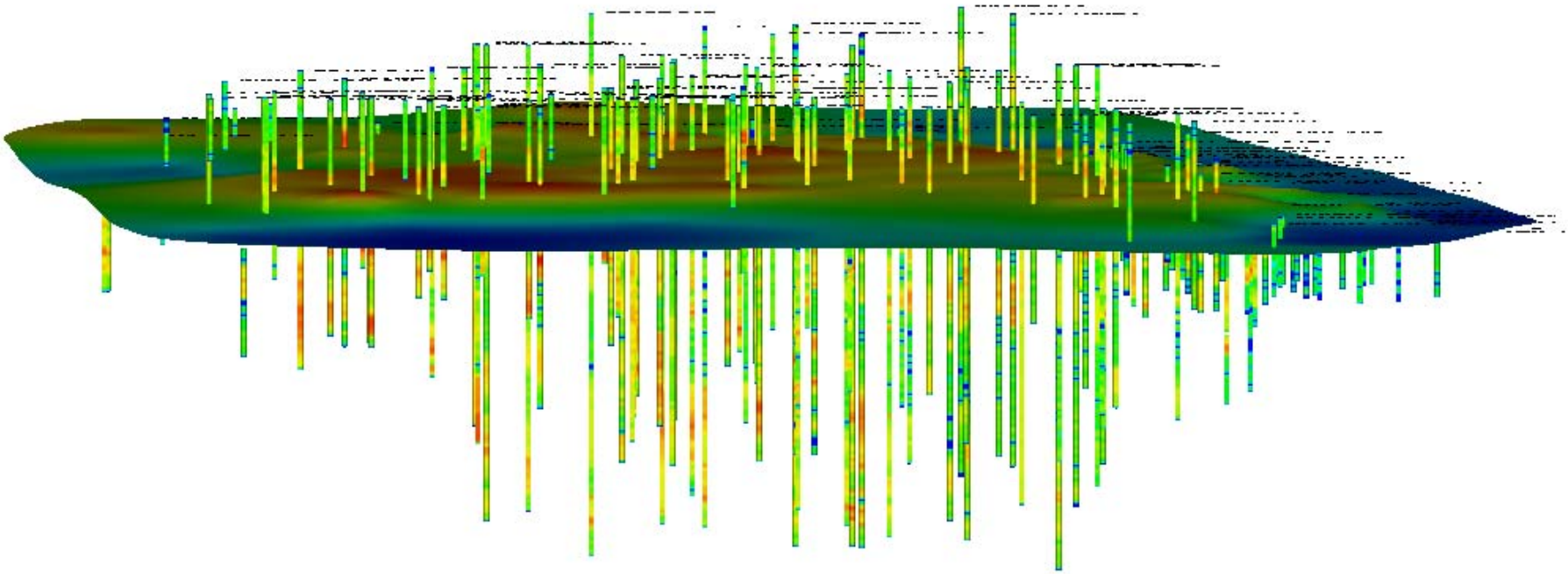
- Original scope – 8.5 Acres/$160M (as much as 1M gallons of contamination
- Use of TarGOST LIF tool has reduced footprint to <5 acres
  - TarGOST able to distinguish free product from dissolved phase contamination
  - Hope to take advantage of discrete viscous PAH NAPL architecture
- Compartmentalization of site into:
  - 'Core'/'Peripheral' and 'Dissolved Phase Areas'
  - Layers as a function of depth
- Used 3-D visualization and Thiessen Polygon approach


S
N - at wall
Compartment 1
Ground surface to - 5 ft MLLW
Compartment 2
- 5 ft MLLW to
10 ft above Aquitard
Compartment 3
10 ft above Aquitard
LEGEND
Ground Surface
Bottom of Compartment 1
Bottom of Compartment 2
Bottom of Boring
Aquitard (top of GT) elev (ft MLLW)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Elevation (ft MLLW)
800
700
600
500
400
300
200
100
0
Distance (ft)

2-D Hot Spot Map

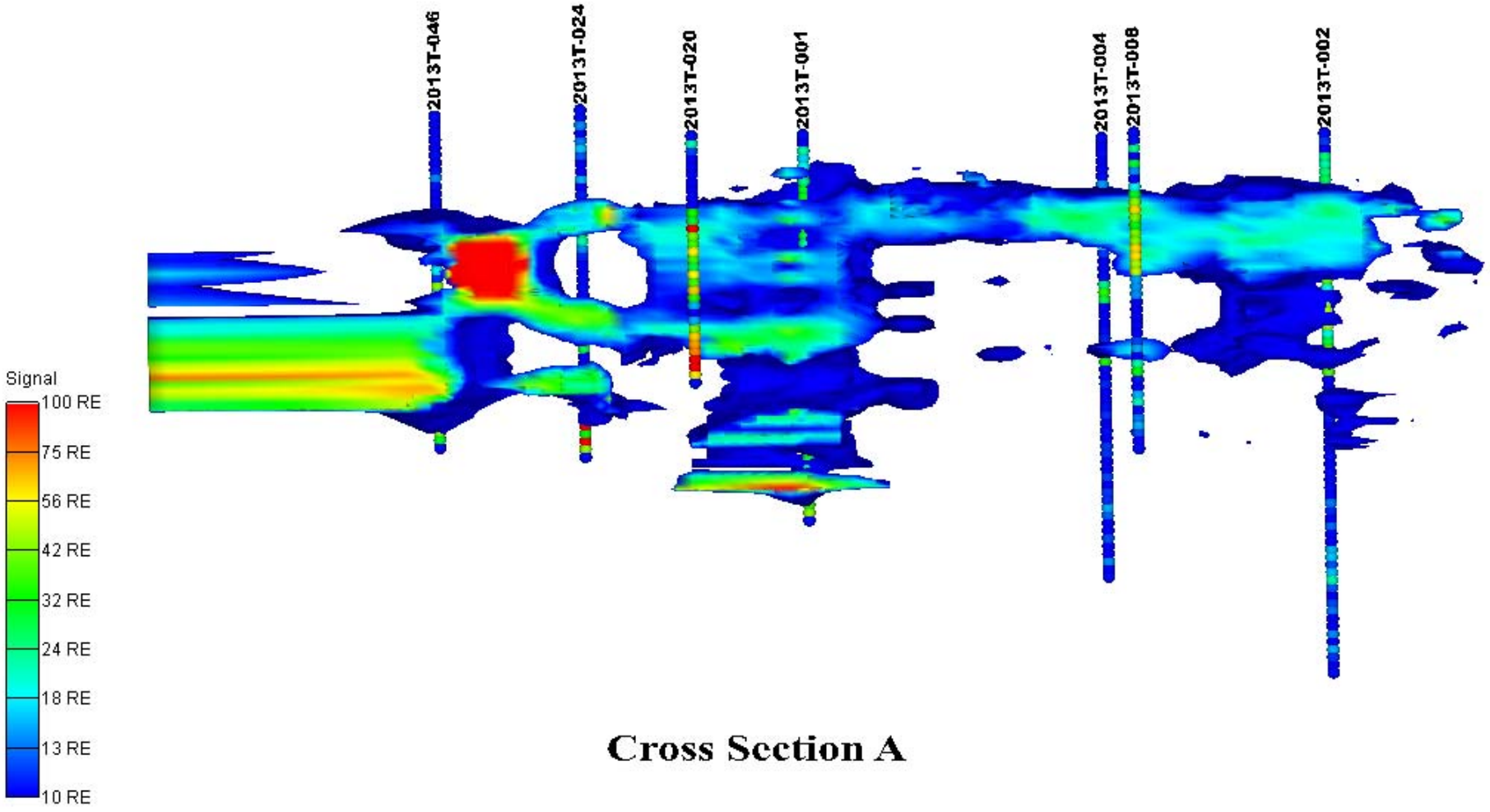


2-D Hot Spot Map – tilted



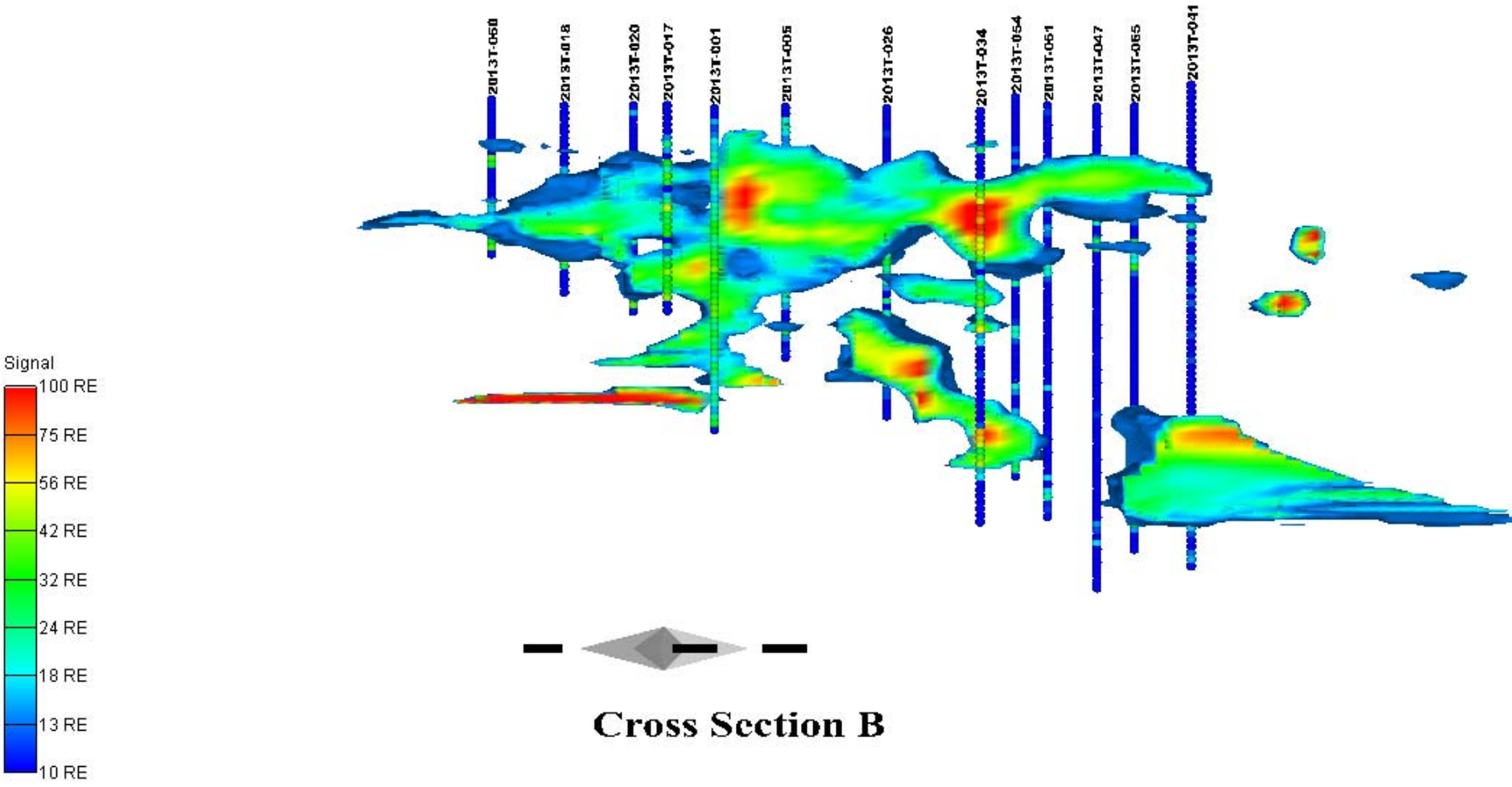
2D Hot Spot Map

Cross Section A-A’

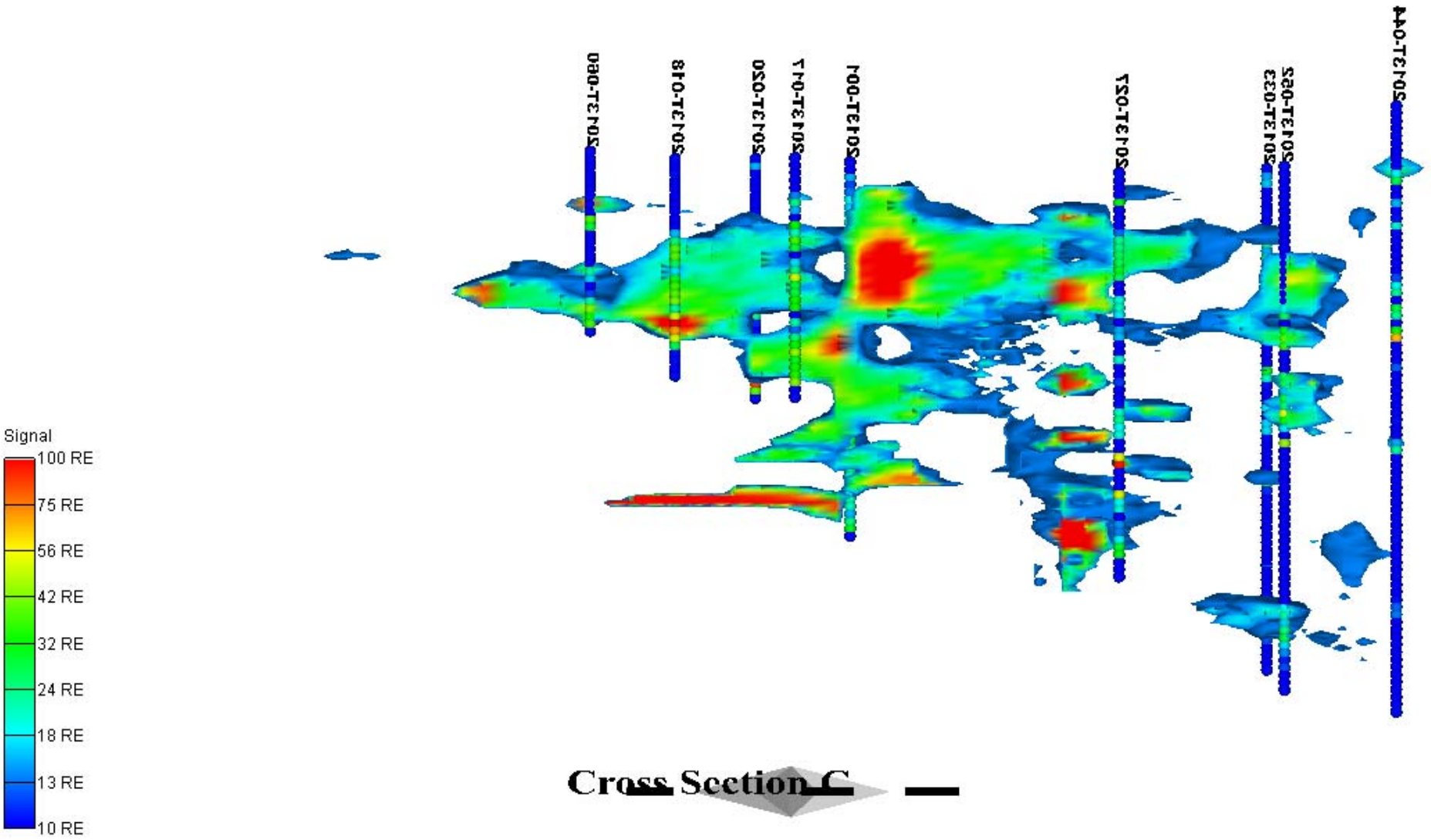


Cross Section A

Cross Section B-B’



Cross Section C-C’



Boundary Conditions/Engineering Design Considerations

- Intended Use: Recreational Area

- State would like to discontinue pump and treat operations within 10 years

- Restoration of the Resource 'In a reasonable time frame'

- Culmination of Upland Remedial Activities in a timeframe consistent w/ life expectancy of the sheet pile wall

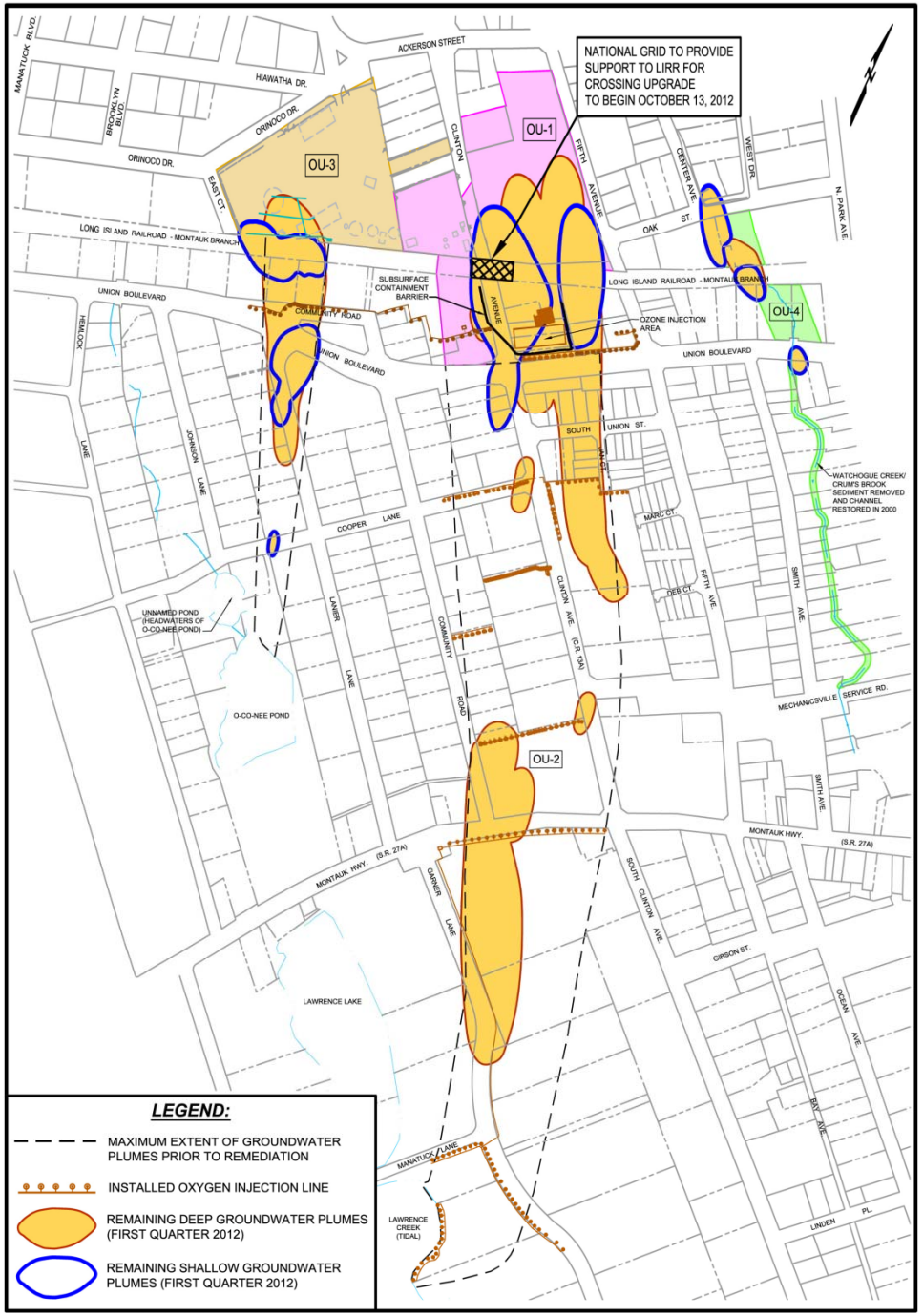
- Protect Lower Aquifer
  - Concerns re competency of aquitard

Focused Feasibility Study Underway

- Expanded beyond thermal remedies to include ISS, ISCO, Bio and 'STAR' – an innovative smoldering technology
- Tools vary in the extent to which they can be employed (semi-) surgically
- Promising developments in use of Bio-Sparging to address aerobically biodegradable PAHs
- Medium term – convert the sheet pile wall to a PRB?

Polishing -Bay Shore MGP Site (PAHs)

- OU1
  - Ozone treatment system
- OU2
  - Eight oxygen injection systems
- OU3
  - Series of 21 slurry-injection points
  - Compound slowly dissolves and releases oxygen over a time period of several months.



Challenges

- Achieving requisite resolution regarding NAPL architecture
  - 'Oversampling in 'Z' dimension, undersampling in 'X' and 'Y'
  - Current 3-D visualization software has limitations ('Ban the Blob')
    - Need for *'Interpretation Before Interpolation*' – Dr. Dave Rich
- Need better insights/indicia for spatial and temporal transition between technologies
  - 'How much to heat, how much to eat'…
- Need better tools for predicting resource restoration timeframes
- Need 'rear guard' tools – Long term, low/no maintenance technologies to deal w/ residual contaminants

Thank You.