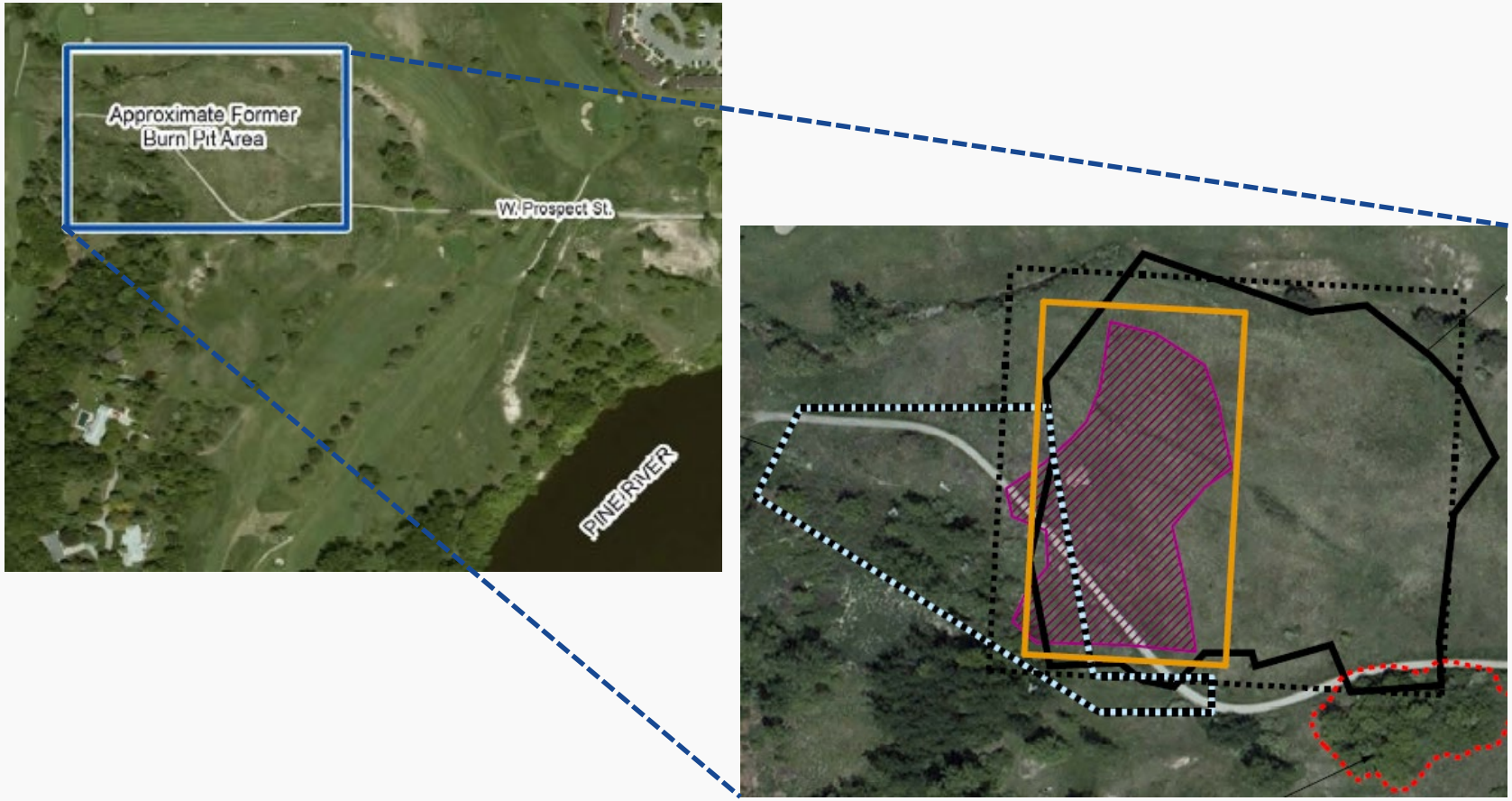
Velsicol Burn Pit Cleanup
Operable Unit 1 – Source Area

June 17, 2015 CAG Presentation

960595



Velsicol Burn Pit Site

Presentation Goals

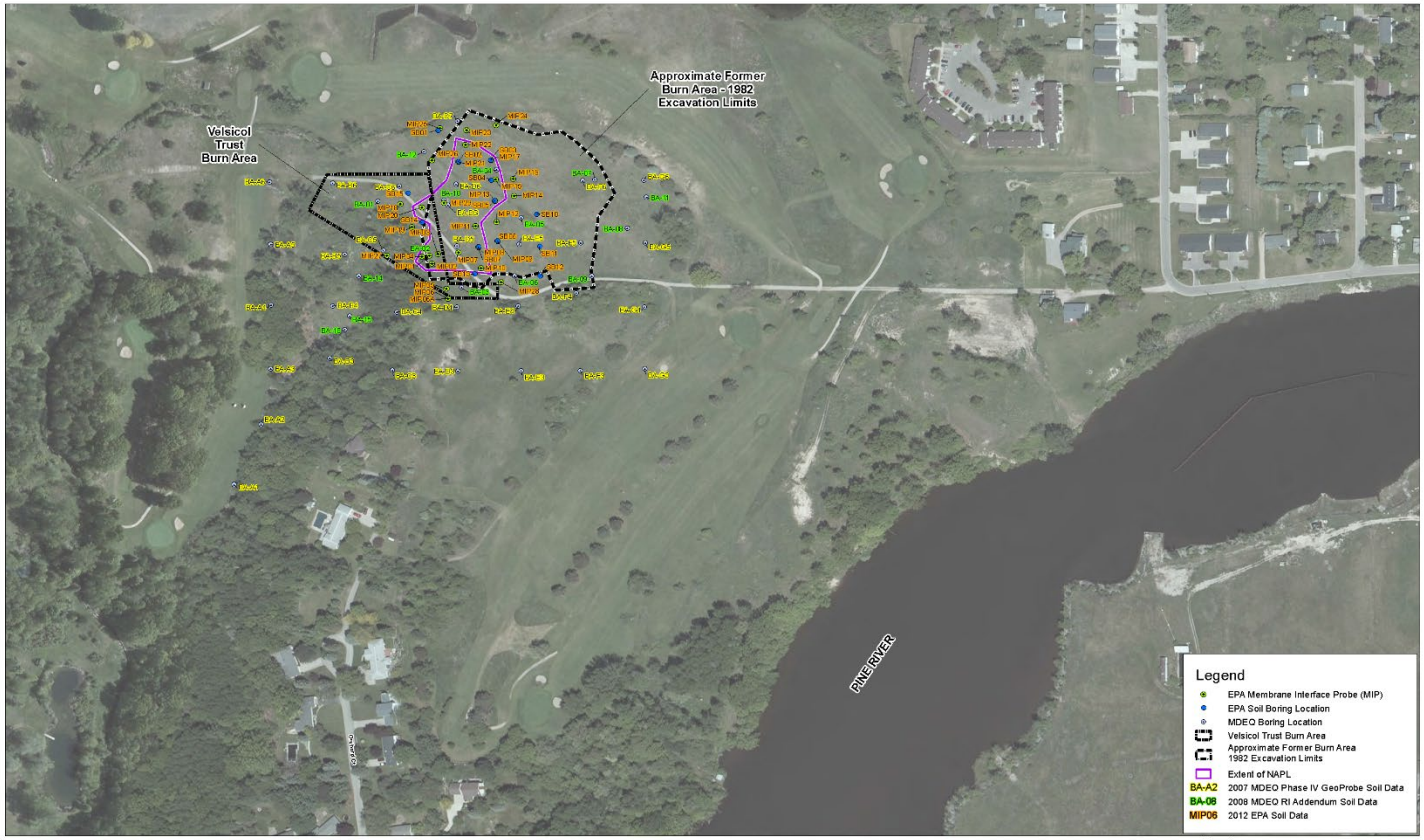
- Review of Site Information
  - Data Summary
  - Risk Summary
- Alternative Assembly, Evaluation & Comparison
- Present the Preferred Alternative for Operable Unit (OU) 1 (Source Area)
- Discuss Monitoring
- Describe Overall Site Strategy & OU2 (Groundwater)

SITE DATA SUMMARY

Velsicol Burn Pit Data Summary

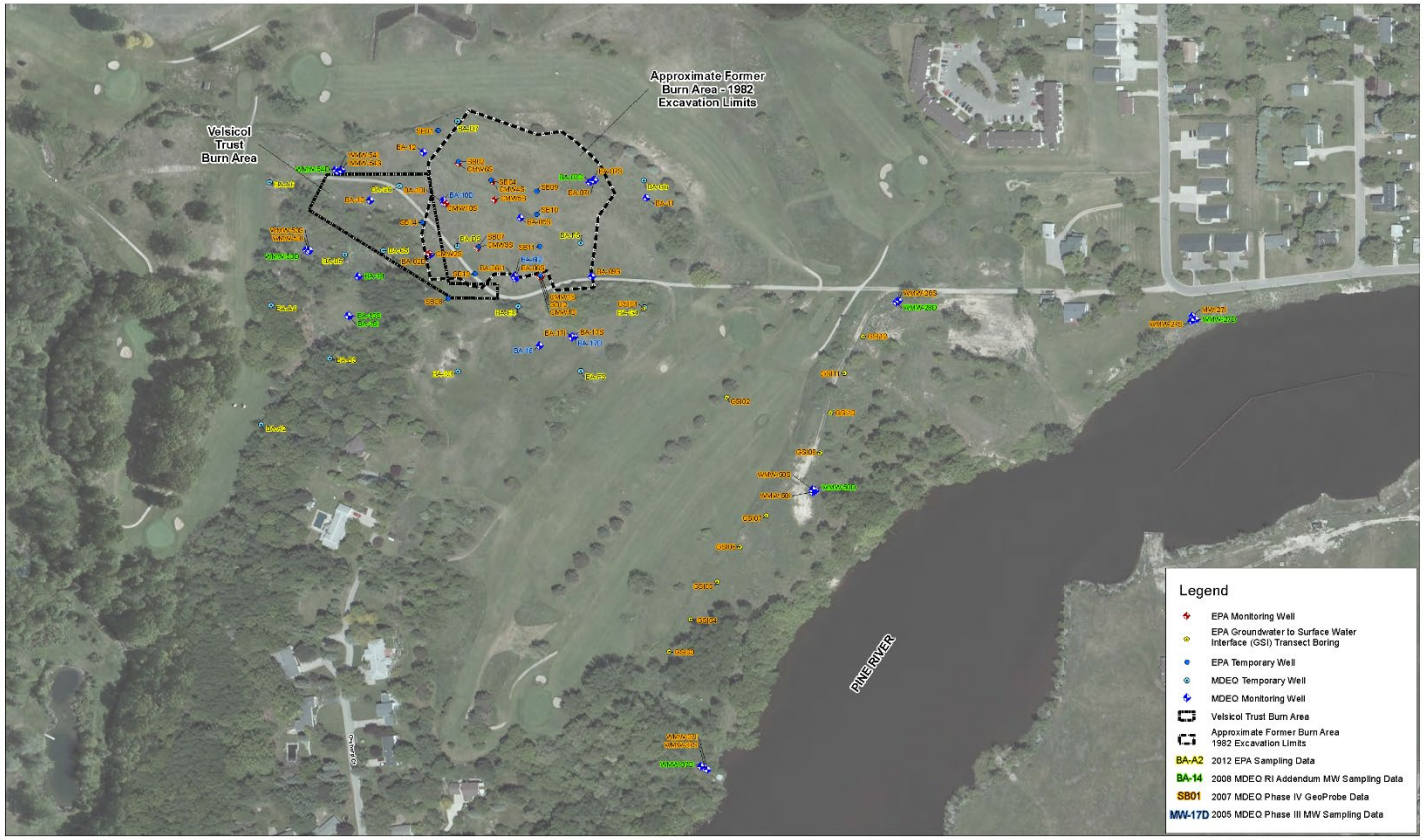
- Contaminants of concern
  - Benzene
  - 1,2-Dichloroethane (1,2-DCA)
  - 1,2-Dibromo-3-Chloropropane (DBCP)
  - Metals (Magnesium, Selenium, Arsenic)
- Target media and depth
  - Soil ~ 10 to 30 feet
  - Groundwater ~ 3 to 30 feet
- Principal Threat Waste
  - Non-Aqueous Phase Liquid (NAPL)
    - “Light”, LNAPL: Floats water
    - “Dense”, DNAPL: Sinks below water

Soil – Locations Sampled



Soil – Locations Impacted

Groundwater – Locations Sampled



Groundwater – Locations Impacted

Does Site Contamination Pose Risk ?

- Remediation is Required when
  - Cancer Risk: 1 in 10,000 excess lifetime cancer risk.
  - Non-Cancer Risk: Hazard Index of 1

=

- Current Conditions
  - Human health: **NO**
  - Ecological: **Yes**
- Future Conditions
  - Human health: **Yes**
  - Ecological: **Yes**

- ***Basis for Action is to address future risk scenarios.***

TECHNOLOGY SCREENING & ALTERNATIVE ASSEMBLY

Screen Technologies Then Assemble Alternatives

- Preliminary screening considers technology options which are screened for:
  - Effectivness
  - Implementablity
  - Cost (high, medium, low)
- Alternatives assembled from retained options

Five Alternatives were Assembled and Evaluated

- Alternative 1 – No Action (Required)
- Alternative 2 – Soil Containment and Capping
- Alternative 3 – In-Situ Soil Stabilization and Soil Cover
- Alternative 4 – In-Situ Thermal Treatment and Soil Cover
- Alternative 5 – Hot Spot Excavation and Disposal

ALTERNATIVE EVALUATION & COMPARISON

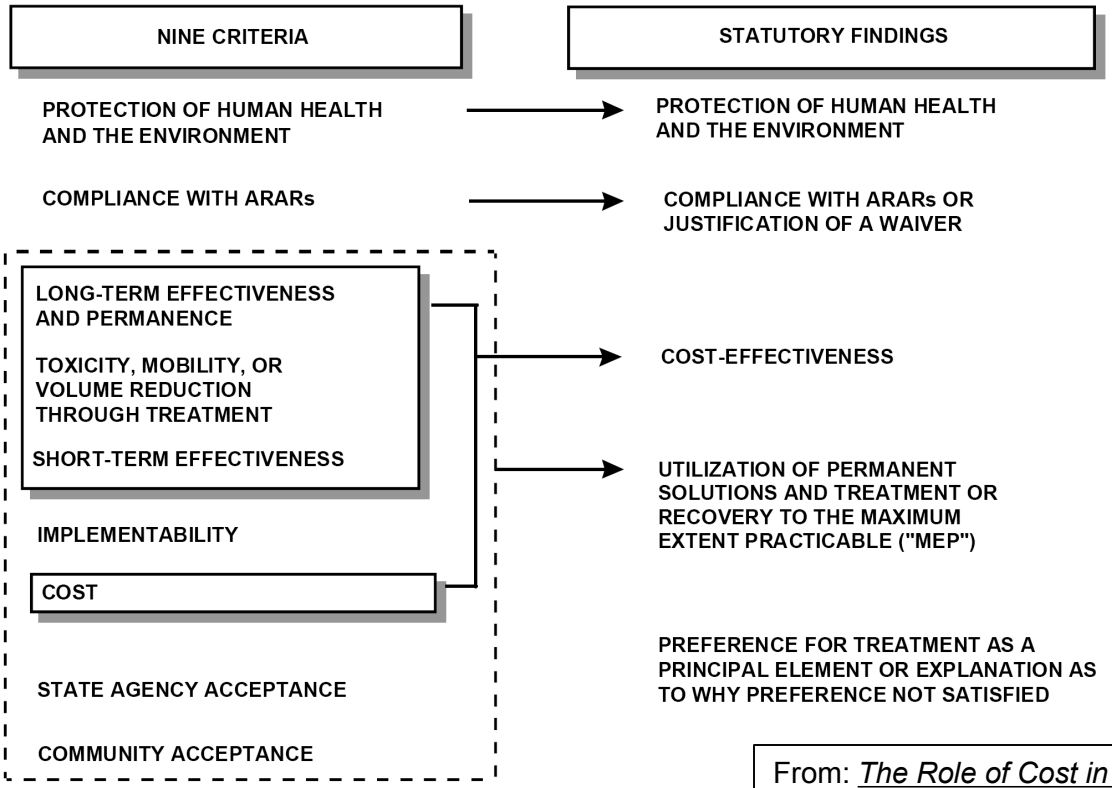
Alternative Evaluation – Nine Criteria

- Threshold Criteria
  - Overall protection of human health and the environment
  - Compliance with applicable or relevant and appropriate requirements (ARARs)
- Balancing Criteria
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility, or volume through treatment
  - Short-term effectiveness
  - Implementability
  - Cost
- Modifying Criteria
  - State Acceptance
  - Community Acceptance
- Cost Alone is *not* a Deciding Criterion
- Meet Threshold Criteria + Best Balance of Criteria for Long Term Risk Management and Reduction

Alternative Evaluation – Relationship to Superfund Law

Exhibit 2

RELATIONSHIP OF THE NINE CRITERIA TO THE STATUTORY FINDINGS



From: *The Role of Cost in the Superfund Remedy Selection Process Quick Reference Sheet*. (U.S. EPA ,September 1996)

Long Term Effectivness

Alternative 4

- Removes and destroys site contaminants
  - In soil
  - In groundwater
- Post treatment benefits (heat) promote continued groundwater treatment
- Removes contaminants that present the highest risk for migration

Alternative 5

- Only soil contaminants are removed
- Groundwater is left untreated

Toxicity Reduction

Alternative 4

- Removes and destroys site contaminants
  - In soil
  - In groundwater
- Principal threat waste (NAPL) is treated
- Achieves CERCLA preference of treatment

Alternative 5

- Only soil contaminants are removed
- Excavation is not treatment

Short Term Effectivness

Alternative 4

- Atmospheric emissions of DBCP are controlled and more protective for community and site workers
- Highly effective for removal and destruction of site contaminants
- Less truck traffic through community areas

Alternative 5

- Emissions control during open excavation and soil management is difficult and poses unnecessary risk to receptors
- Golf course closure required

Implementability

Alternative 4

- Demonstrated technology
- Highly implementable with limited site disruption
- Implementation without course closure is feasible
- Requires less overland traffic

Alternative 5

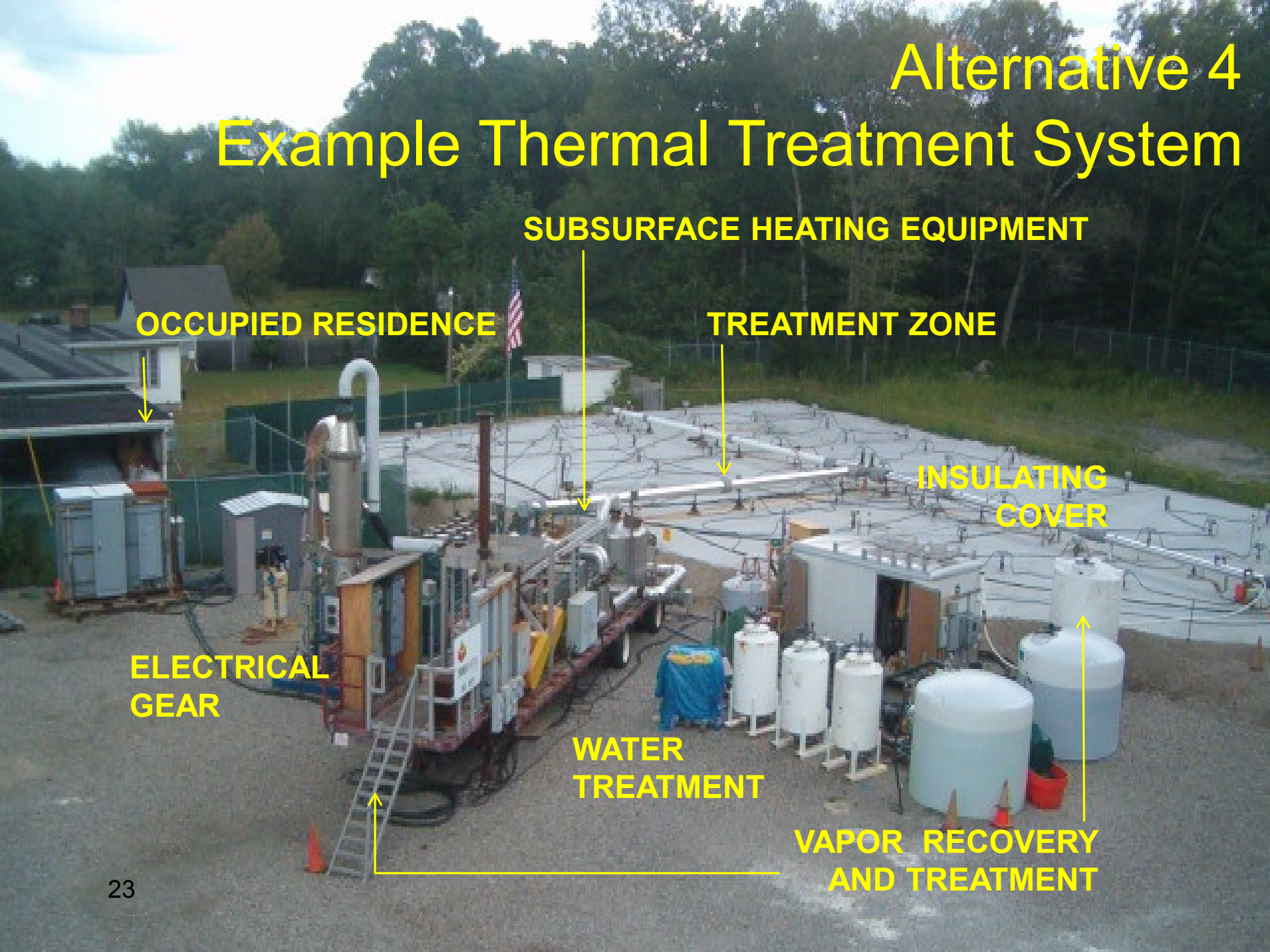
- Excavation to till is technically challenging and potentially dangerous
- Management of excavated soil is a major logistical challenge.
- Golf course closure required

EPA & MDEQ Prefer Alternative 4

- Protective of human health and the environment, and is the best balance of criteria.
- Removes Principal Threat Wastes (NAPLs) *Through Treatment*:
  - In-Situ Thermal Treatment of 1.4 acres all the way down to the Till Unit.
- Minimizes disruption and short-term exposure risk to land owners and surrounding community.
- Manages residual risks with compacted soil cover over 5 acres, institutional controls and monitoring.
- Compact site with existing recreational usage is ideal for In-Situ Thermal Treatment.

WHAT TO EXPECT WITH IN-SITU THERMAL TREATMENT

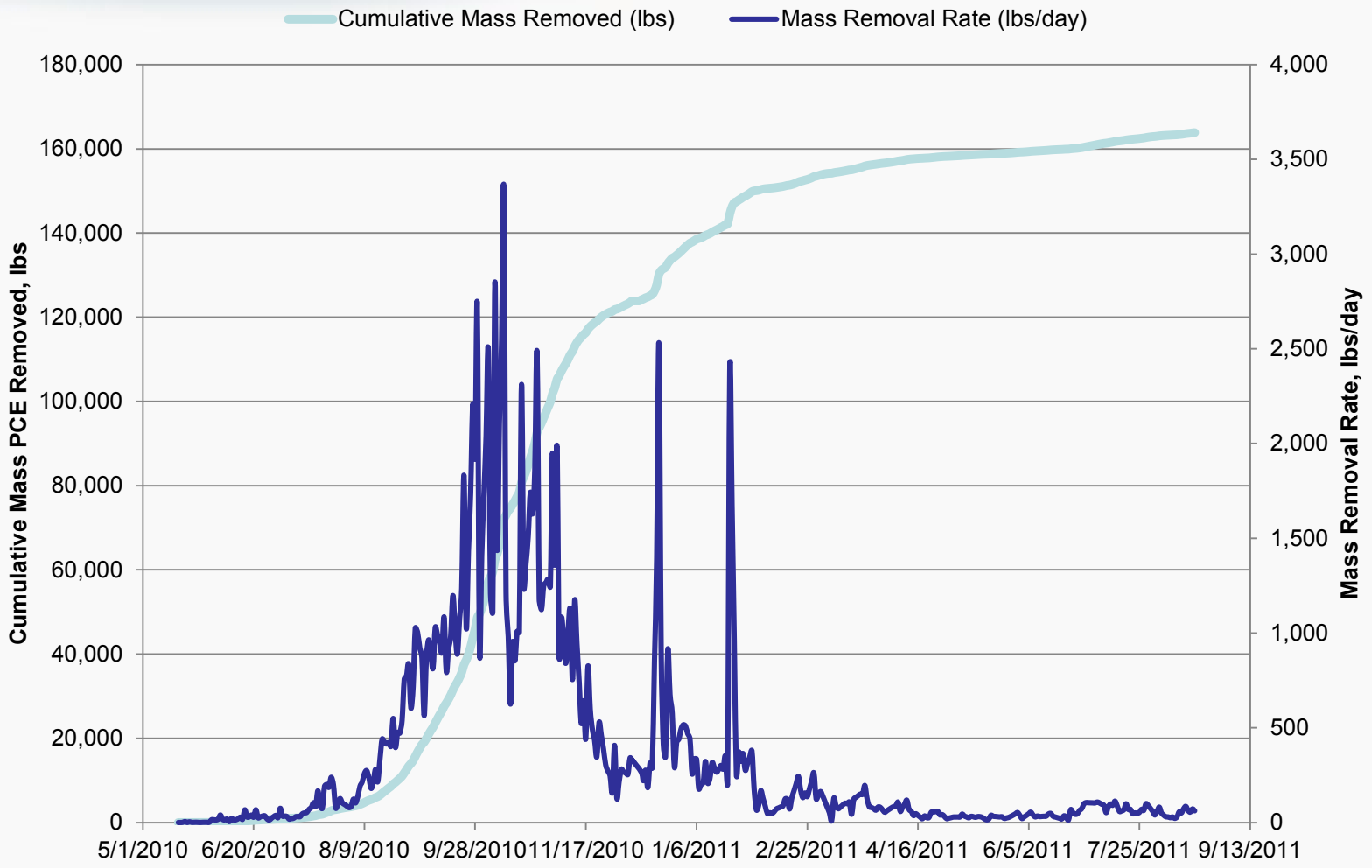
Alternative 4
Example Thermal Treatment System



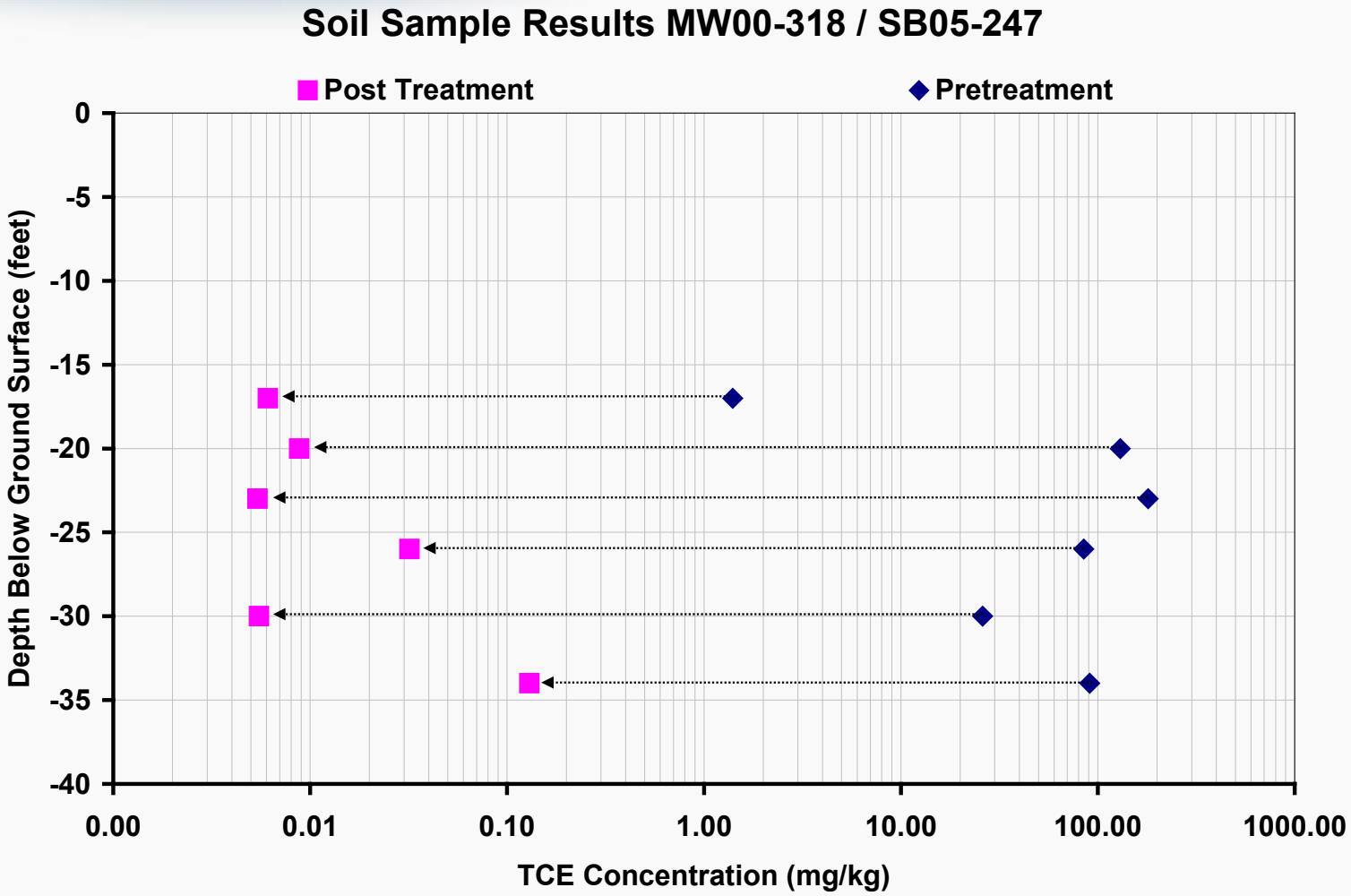
Monitoring Thermal Treatment Performance

- **<u>Contaminant removal is assessed in many ways using multiple lines of evidence</u>**
- Subsurface Temperature
  - Lateral and vertical measurement
  - Real time monitoring
- Measurements over Time
  - In-situ pressure, groundwater elevation, vapor concentration, flow, temperature
- Discrete Sampling (extracted vapors and liquids)
- Post-Treatment Sampling (soil, groundwater)

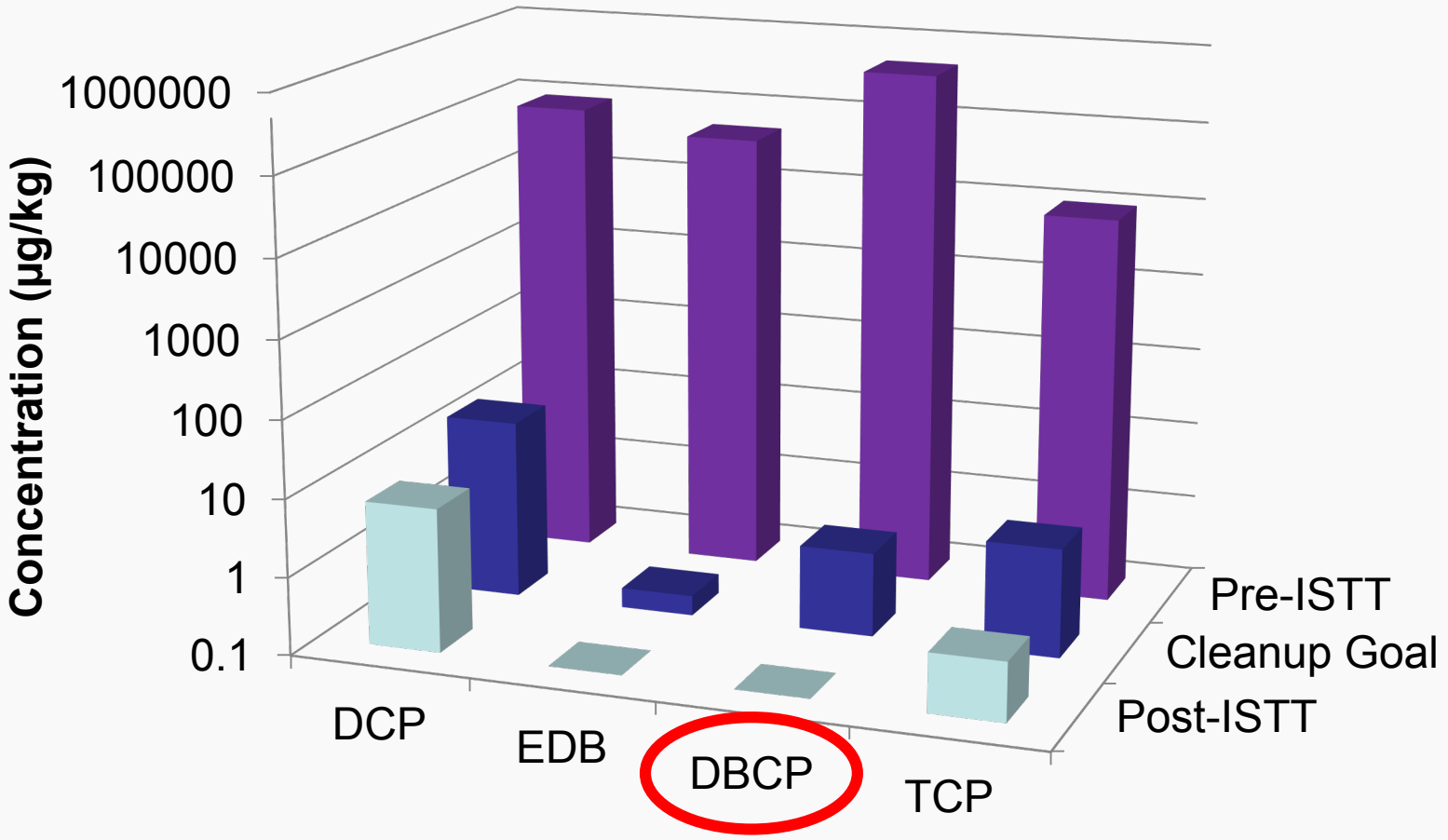
Process Monitoring Demonstrates Mass Removal



Pre-Treatment & Post-Treatment Comparison



Soil Treatment Performance Summary



Basis of Diminishing Returns Analysis

- Temperature and time control technology performance
  - Thermal monitoring data document target temperature achievement.
  - Operation time at target temperature drives contaminant removal.
- Instantaneous mass removal rate is measured with time
  - Mass removal typically peaks around co-boiling temperature.
  - With increasing time and temperature removal rates decline.
- Rate analysis yields cumulative contaminant mass removed
  - Total mass removed approaches asymptotic conditions with time.
- The simultaneous evaluation of ***temperature***, ***time*** and ***contaminant mass removal*** form the basis of the diminishing returns analysis
  - Results are the first line of evidence that treatment is complete.

OVERALL SITE STRATEGY & OU2 (GROUNDWATER)

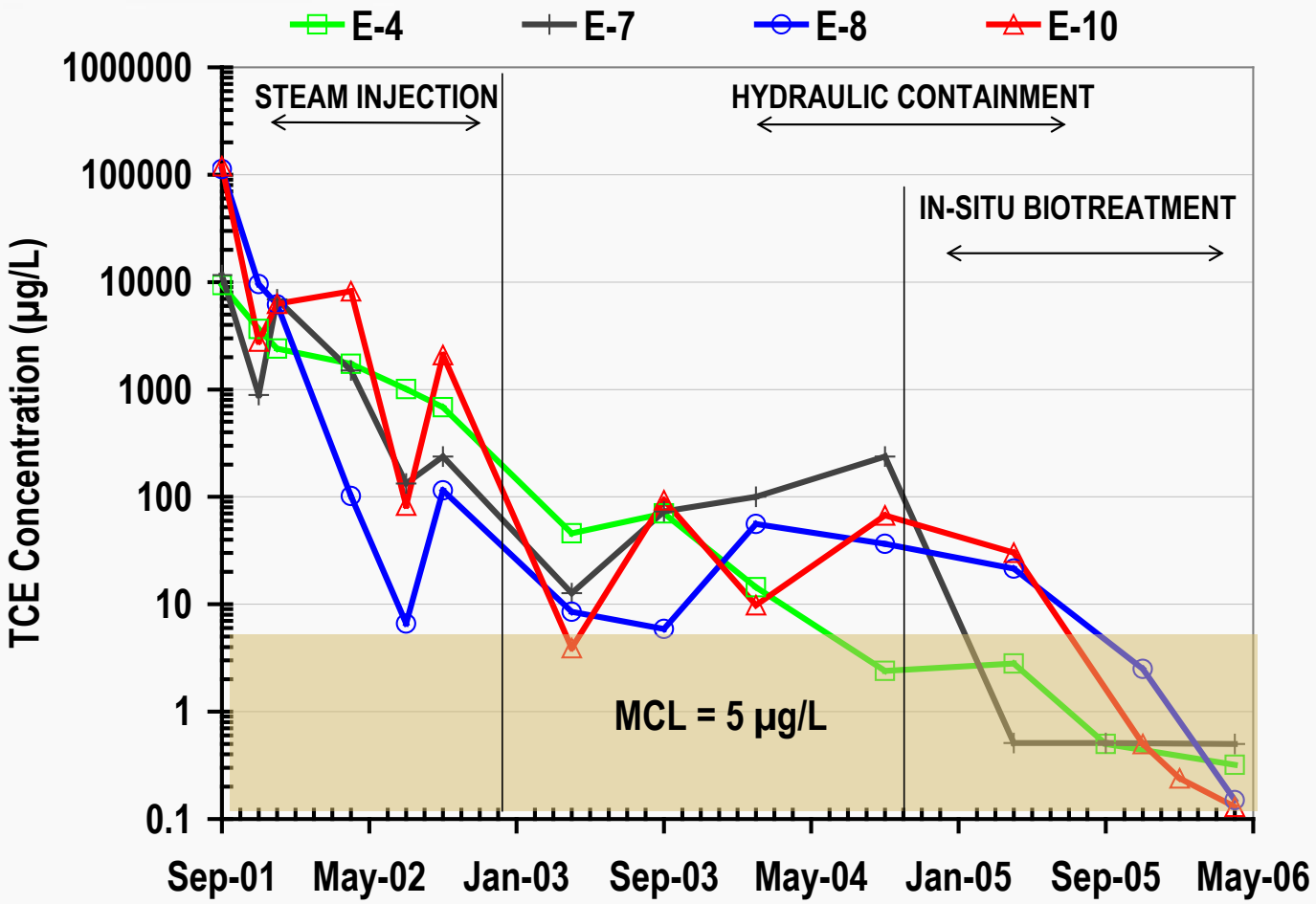
Why Two Operable Units?

- EPA and MDEQ agreed to create a distinct OU for groundwater
  - Allows for better management of site risks
    - OU1 = Source Area (current cleanup action & ROD)
    - OU2 = Groundwater (future cleanup action & ROD)
  - Site-specific data and risks support a Combined Remedy (two OUs) approach to the site.
  - Allows for monitoring of beneficial effects on Groundwater (OU2) from Source Area (OU1) remediation.
  - Creates an additional opportunity for “official” public involvement under the Superfund Process.
- Thermal treatment results from other sites supports this approach

Combined Remedy Approach Example – Oregon Solvent Site

- Voluntary cleanup of an active manufacturing site
- Solvent release to shallow groundwater
  - NAPL source contaminates groundwater
  - Dissolved contaminants migrate off site > 1000 feet
- In-Situ Thermal Treatment (ISTT) selected for Source Area removal
- Containment system installed for interim plume control
- Groundwater remedy deferred until ISTT was complete
  - Source Area removal by ISTT was successful
  - Beneficial effects immediately apparent on site groundwater
  - Containment no longer needed; Natural in-situ biological processes took over following contaminant source removal
- Combined remedy delivered No Further Action determination

Combined Remedy Approach Example – Oregon Solvent Site



Summary

- Alternative 4 provides the best balance of criteria.
- Thermal treatment is a safe and effective solution for site contaminants.
- Allows continued use of golf course.
- Less truck traffic through community areas.
- Safest approach considered for treatment of site contaminants.

Next Steps

- Responsiveness Summary completion
- ROD completion
- Remedial Design
  - Potential pre-design sampling to refine design parameters.
  - Increasing levels of design with detailed plans and specifications at each step.