



Beede Waste Oil Superfund Site FYR- 2022

Cheryl Sprague, EPA Remedial Project Manager

sprague.cheryl@epa.gov

617-918-1244

Stephanie Monette, NHDES Project Manager

Stephanie.J.Monette@des.nh.gov

603-271-6778

Kelsey Dumville , EPA Community Involvement Coordinator

Dumville.kelsey@epa.gov

617-918-1003



Site History

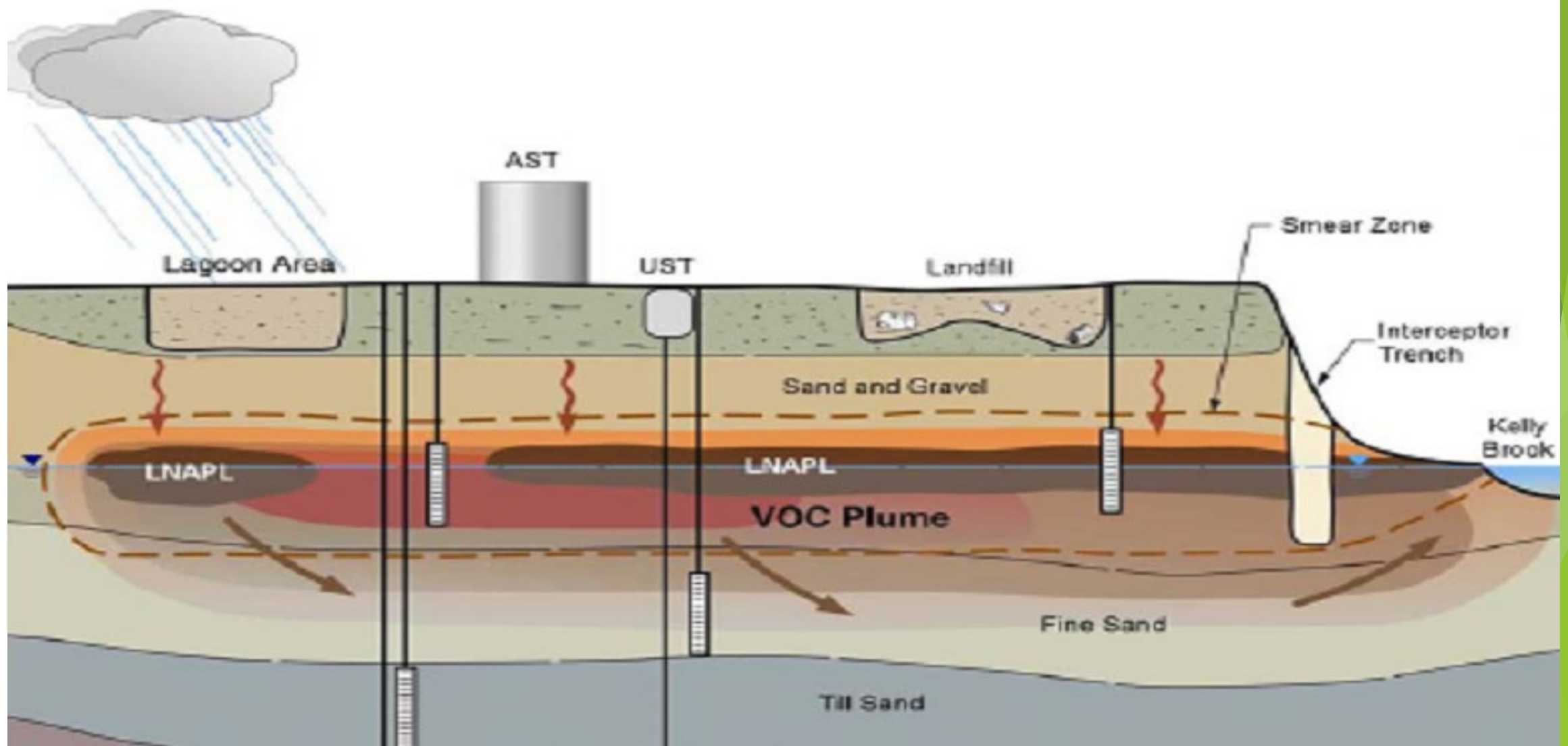
- ▶ Site operations 1920's through 1995
- ▶ 40 acres- 2 parcels
- ▶ Parcel 1- petroleum and waste oil storage and handling



Site Plan



Conceptual Site Model - Cross Section



RISK

EPA considers risk to be the chance of harmful effects to human health or to ecological systems.

EPA uses risk assessment to characterize the nature and magnitude of risks to human health for various populations such as current and future residents, recreational visitors, and workers and assesses risk for both children and adults as well as risks to ecological receptors, including plants, birds, other wildlife, and aquatic life.

Risk depends on the following three factors:

1. **Concentrations present** in an environmental medium (e.g., soil, water, air) over a geographic area,
2. **How much contact (exposure)** a person or ecological receptor has or potentially could have with the contaminated environmental medium (exposure scenarios), and
3. **How it affects** the health of humans (e.g., **toxicity**) or ecological receptors.

Contaminant Concentrations

Soils- 17 Contaminants of Concern

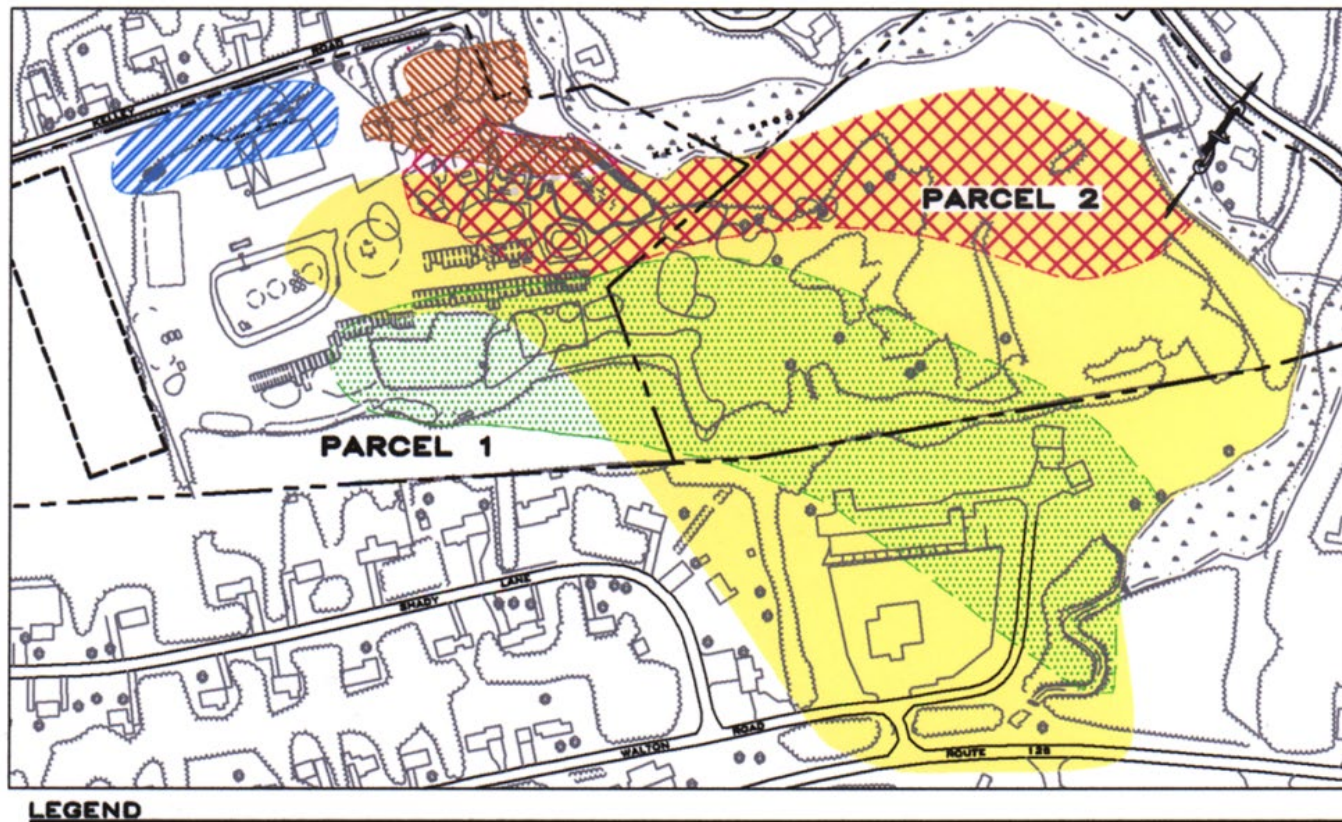
Including:

- ▶ Lead up to 20,000 ppm
- ▶ PCBs >50 ppm
- ▶ Petroleum Hydrocarbons
- ▶ Sediments: 7 Contaminants of Concern including:
 - ▶ PCBs
 - ▶ Arsenic

▶ Groundwater - 21 Contaminants of Concern including:

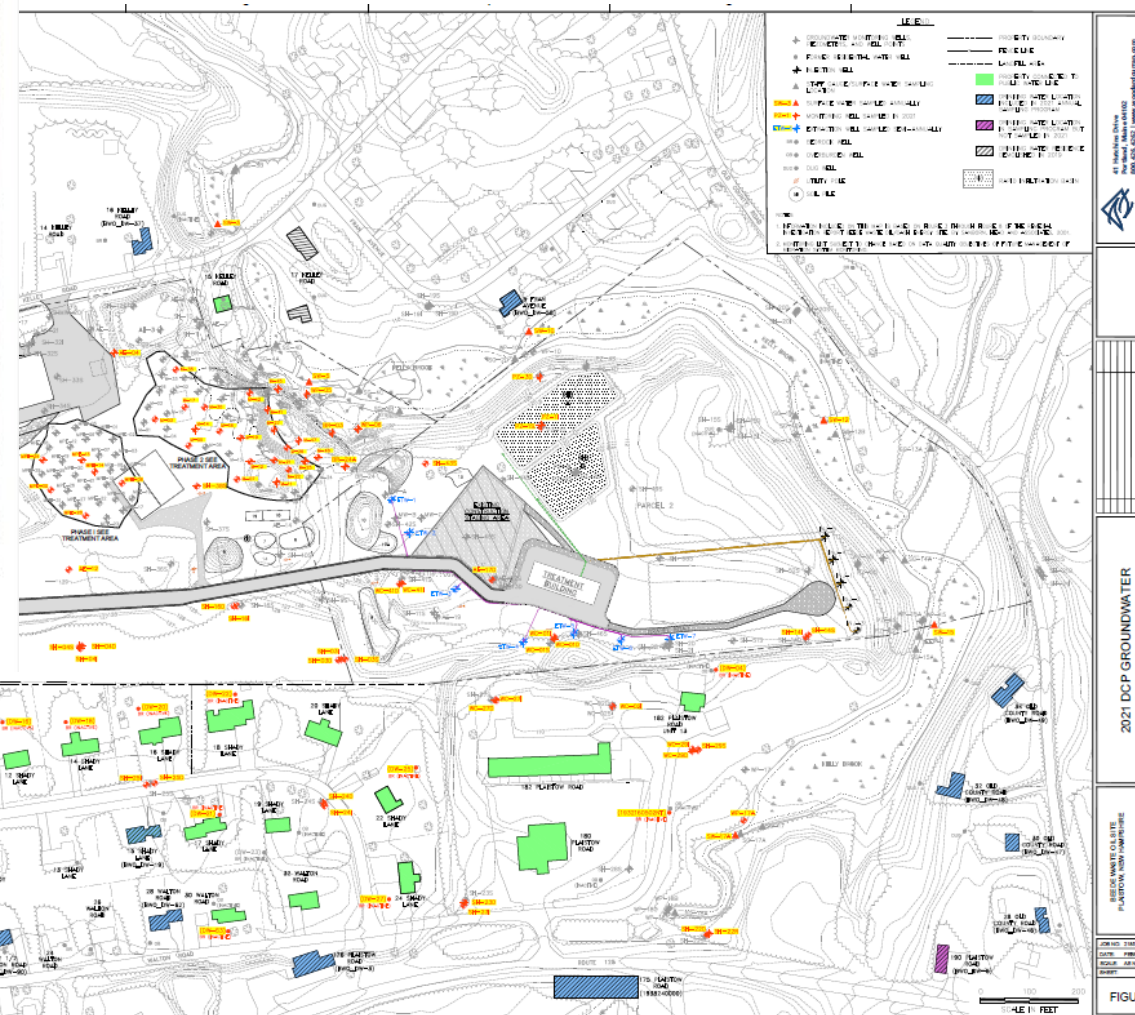
- ▶ Chlorinated VOCs:
 - ▶ PCE
 - ▶ TCE
 - ▶ DCE
 - ▶ DCA
 - ▶ VC
- ▶ Benzene

[illegible]

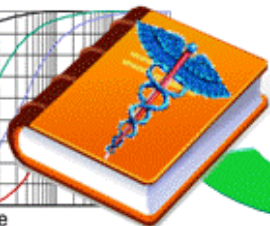
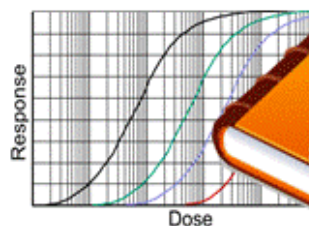


LEGEND

- | | | |
|----------------------------------|--------------------------------|--------------|
| DISTILLATION UNIT PLUME (FORMER) | UST/AST/SWRP 2 PLUME | LAGOON PLUME |
| SWRP 1 PLUME | TETRACHLOROETHENE (PCE) PLUME. | |

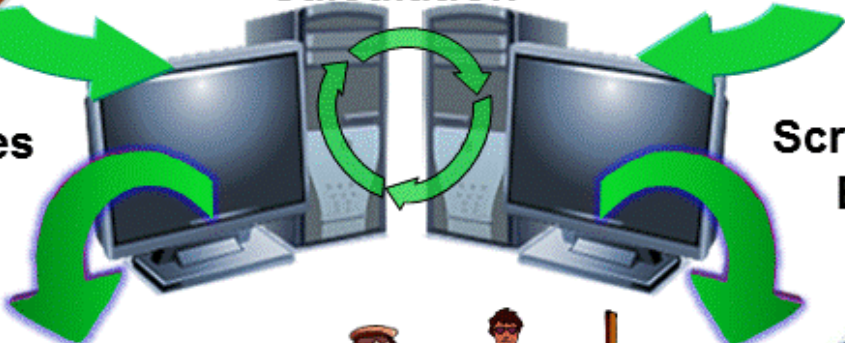


Groundwater



Toxicity Values

Screening Level Calculation



Screening Level Equations



Residential



Construction Worker



Outdoor Worker



Indoor Worker



Recreational

Soil

*ingestion
inhalation
dermal*

Fish

ingestion

Soil to Groundwater
for protection of gw

Tap Water

*ingestion
inhalation
dermal*

Ambient Air

inhalation

Soil

*ingestion
inhalation
dermal*

Soil

*ingestion
inhalation
dermal*

Air

inhalation

Soil

*ingestion
inhalation*

Air

inhalation

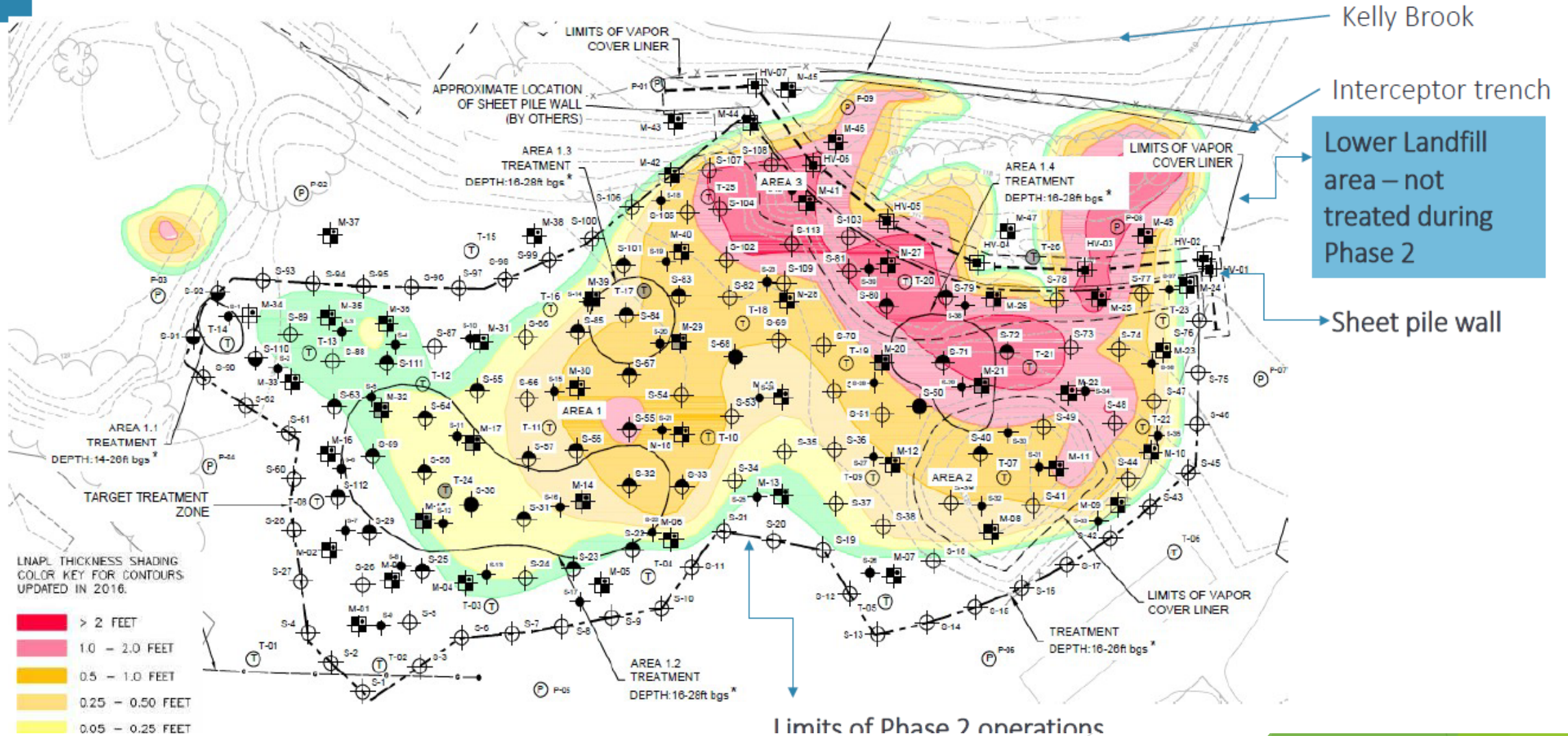
Soil/Sediment

*ingestion
inhalation
dermal*

Surface Water

*ingestion
dermal*

LNAPL (oil) – before Phase 2 Remediation



Deeper soils

Deeper soil contamination is generally associated with the lagoon, UST/AST/SWRP 2/landfill and the smear zones, associated with the LNAPL materials and other releases and generally observed at depths of approximately 5 feet below ground surface to the bottom of the water table smear zone - 20 to 30 feet below ground surface.

- Petroleum Hydrocarbons or PHC concentrations of up to 50,000 mg/kg in deeper soils with the highest concentrations observed below the lagoon and UST areas.
- PCB concentrations in contaminated deeper soils in lagoon and UST areas. PCB concentrations detected in deeper soils from the landfill area were variable and ranged as high as approximately 50 mg/kg. *PCBs greater than 50 ppm are found in the waste oils
- Lead concentrations as high as 400 to 1,100 mg/kg in deeper soils at lagoon, UST and landfill areas.

Treatment of deep soils (i.e. soils deeper than 10 feet below ground surface and/or smear zone soils) is based on the need to remove contaminants to prevent further leaching to groundwater above cleanup standards.



Reuse

- ▶ Reasonable Potential Future Reuse considered:
 - ▶ Zoning – medium use residential
 - ▶ Adjacent properties residential
 - ▶ The Town's reuse assessment/plans which include both residential and recreational uses for the two parcels which comprise the Site.
 - ▶ Public Comment
- ▶ Basis for Response Action:
 - ▶ Risks related soil/sediment/groundwater direct contact and ingestion/ food chain model
 - ▶ Risks related to current and potential future residents
 - ▶ Risks related to future trespassers/recreational users/on-site workers/ Insectivorous mammals
 - ▶ Leaching into groundwater above drinking water standards

Feasibility Study

No Action

Limited Action

Containment

Excavation/Treatment

► **Threshold Criteria**

1. Overall protection of human health and the environment
2. Compliance with ARARs (applicable or relevant and appropriate standards)

► **Primary Balancing Criteria**

3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility or volume
5. Short-term effectiveness
6. Implementability
7. Cost

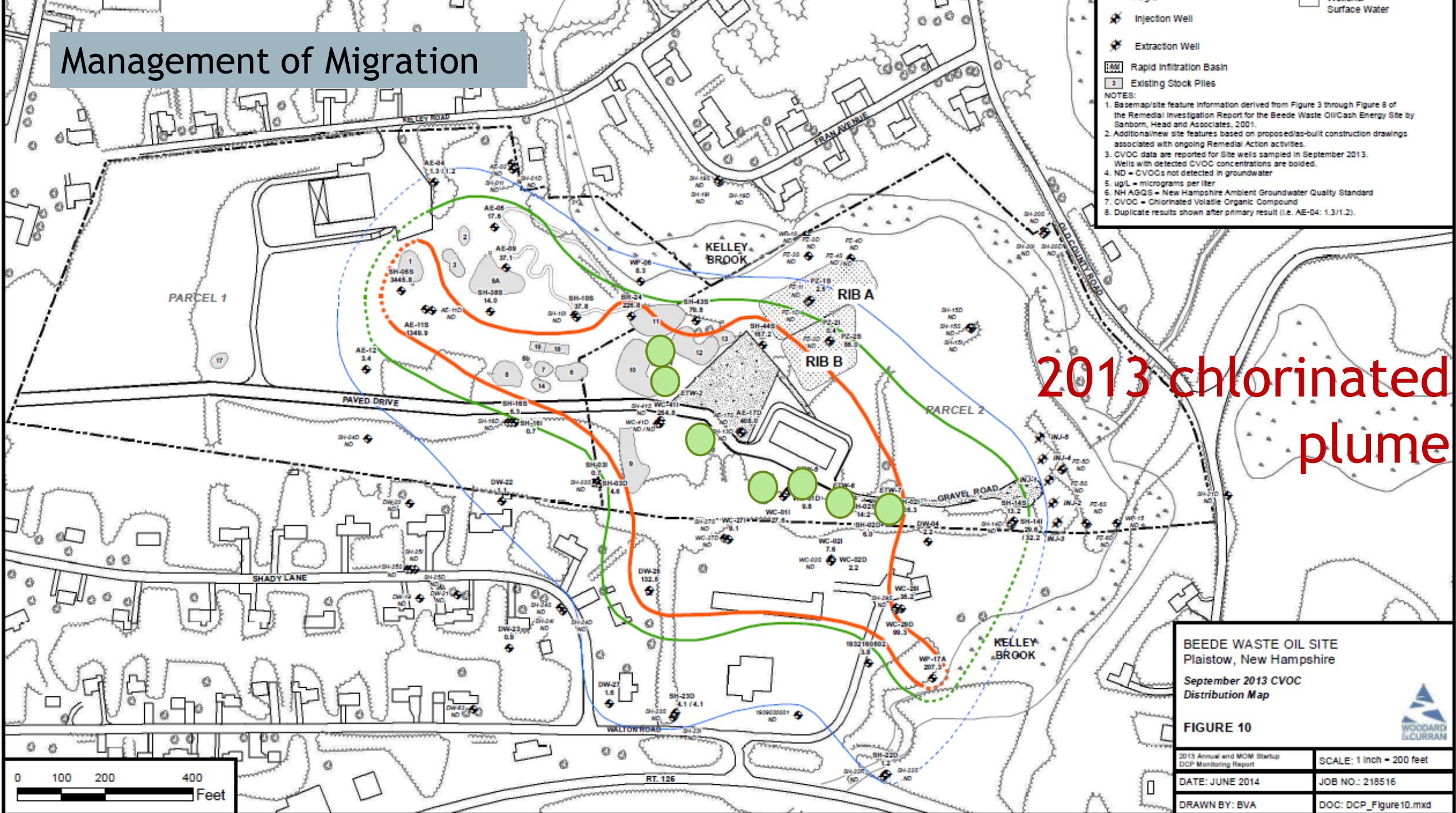
► **Modifying Criteria**

8. State acceptance
9. Community acceptance – EPA releases its Proposed Cleanup plan and accepts public comment

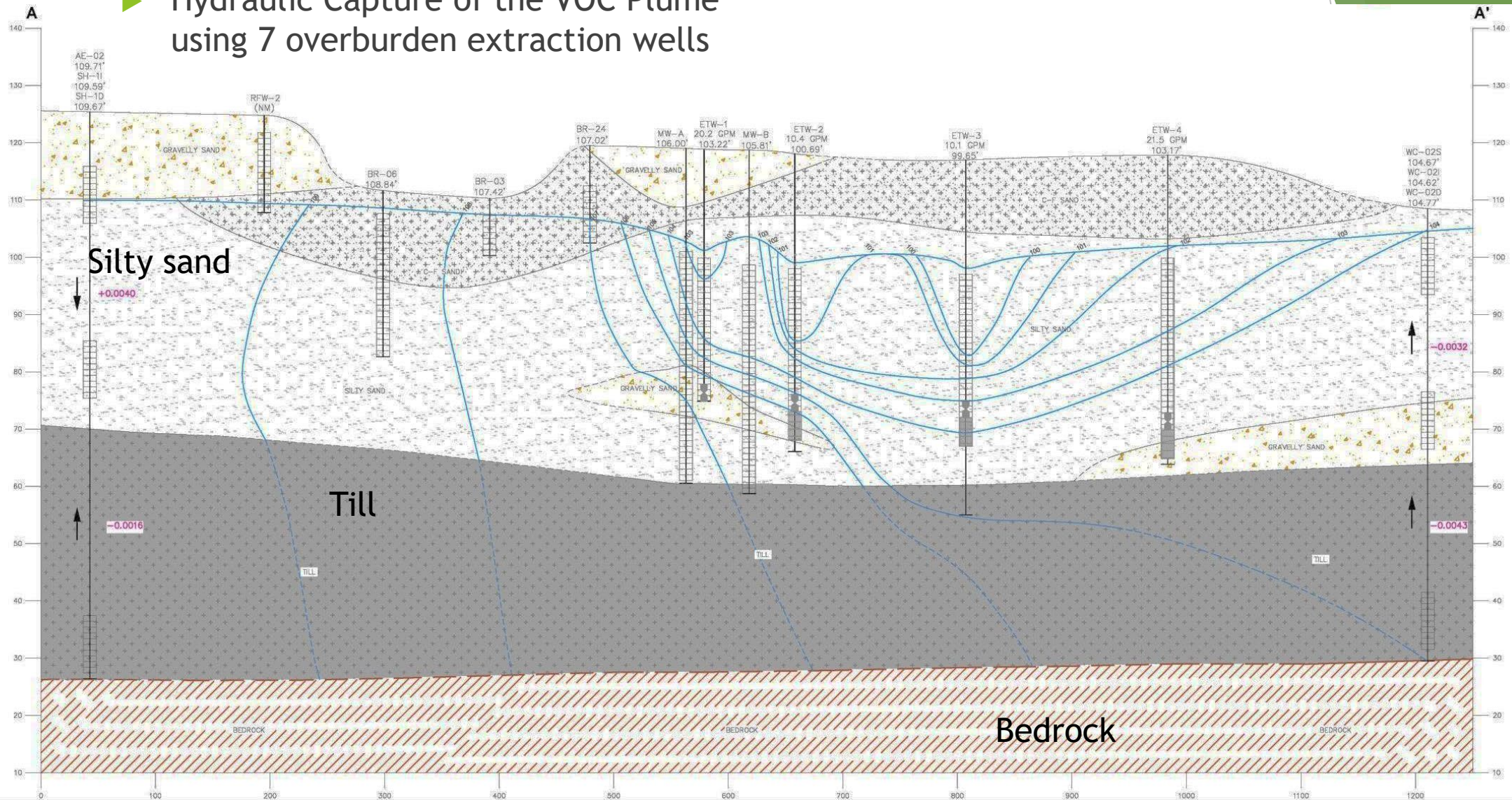
ROD remedy is intended to address human health and ecological threats through:

- ▶ **Source control : Removing threats of direct contact with contaminated soils via excavation of contaminated soil and sediment. Eliminating known sources of surface water and groundwater contamination.**
- ▶ **Groundwater (management of migration): Removing threats of ingestion with contaminated groundwater, restoring the aquifer and preventing plume migration** via Extraction and on-Site treatment of groundwater with limited areas of natural attenuation.
- ▶ **Long-term monitoring** of groundwater and surface water to ensure the effectiveness of the remedy.
- ▶ **Institutional controls** permanently prevent excavation of deep soils (i.e., greater than ten feet below ground surface), and temporarily prevents ingestion of groundwater until restoration to drinking water standards is achieved.

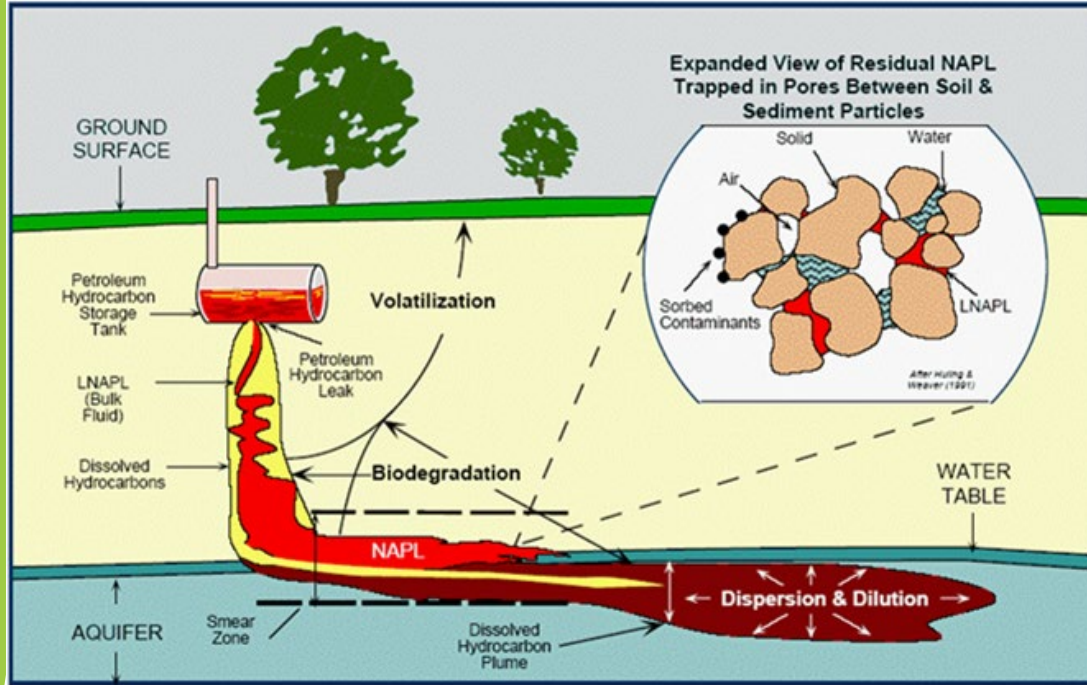
Management of Migration



► Hydraulic Capture of the VOC Plume using 7 overburden extraction wells



Thermal Remediation Actions



Thermal remedy success!



Temperature and soil clean-up goals met

- ✓ Boiling point of water across treatment area (~100°C)
- ✓ ROD leachability soil goals achieved

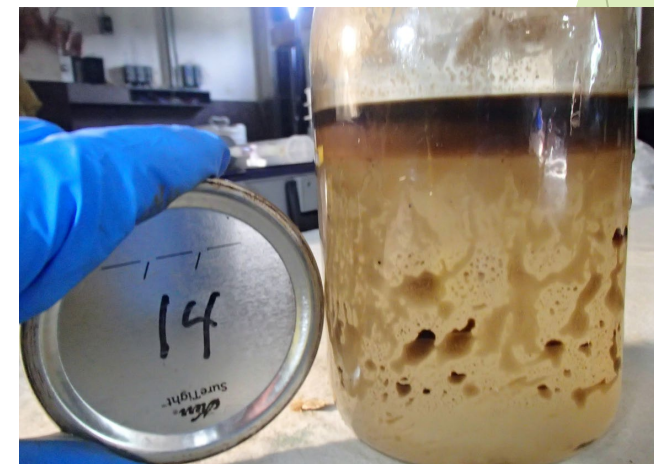
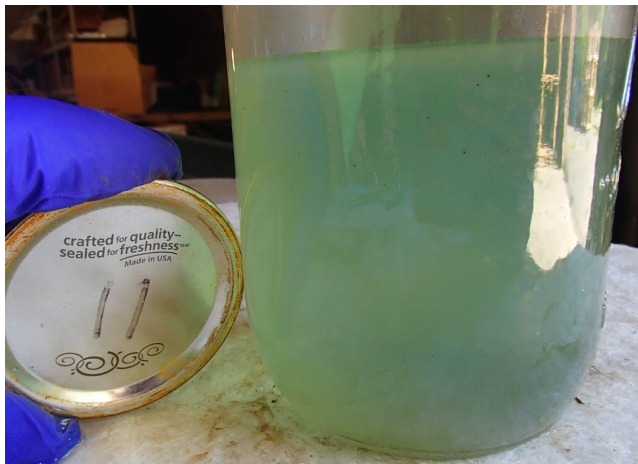


Removed over 500,000 lbs VOC mass
Recovered over 70,000 gallons of oil

Recognized by EPA in their
Superfund FY 2020 Annual
Accomplishments Report!



From: <https://www.epa.gov/work/4-42/100002803.pdf>





Lower Landfill, smear zone and Kelly Brook Wetland Sediment excavation

Estimated excavation volumes



Shallow soil and landfill debris ~
4,400 cubic yards (cy)



Smear zone soil (oil impacted) ~
1,700 cy



Interceptor trench concrete ~
70 cy



Sediment ~ 325 cy





Backfill and Restoration



Five Year Review

- ▶ Evaluates current status/summary of cleanup
- ▶ Evaluates the Functions of the Remedy
- ▶ Evaluates current protectiveness of the remedy against changes in toxicity values, exposure assumptions and methods of evaluating risk, as well as potential standards since the ROD was issued in 2004.
- ▶ Has any other information come to light that could call into question the protectiveness of the remedy?
- ▶ Issues and Recommendations
- ▶ Protectiveness Statement

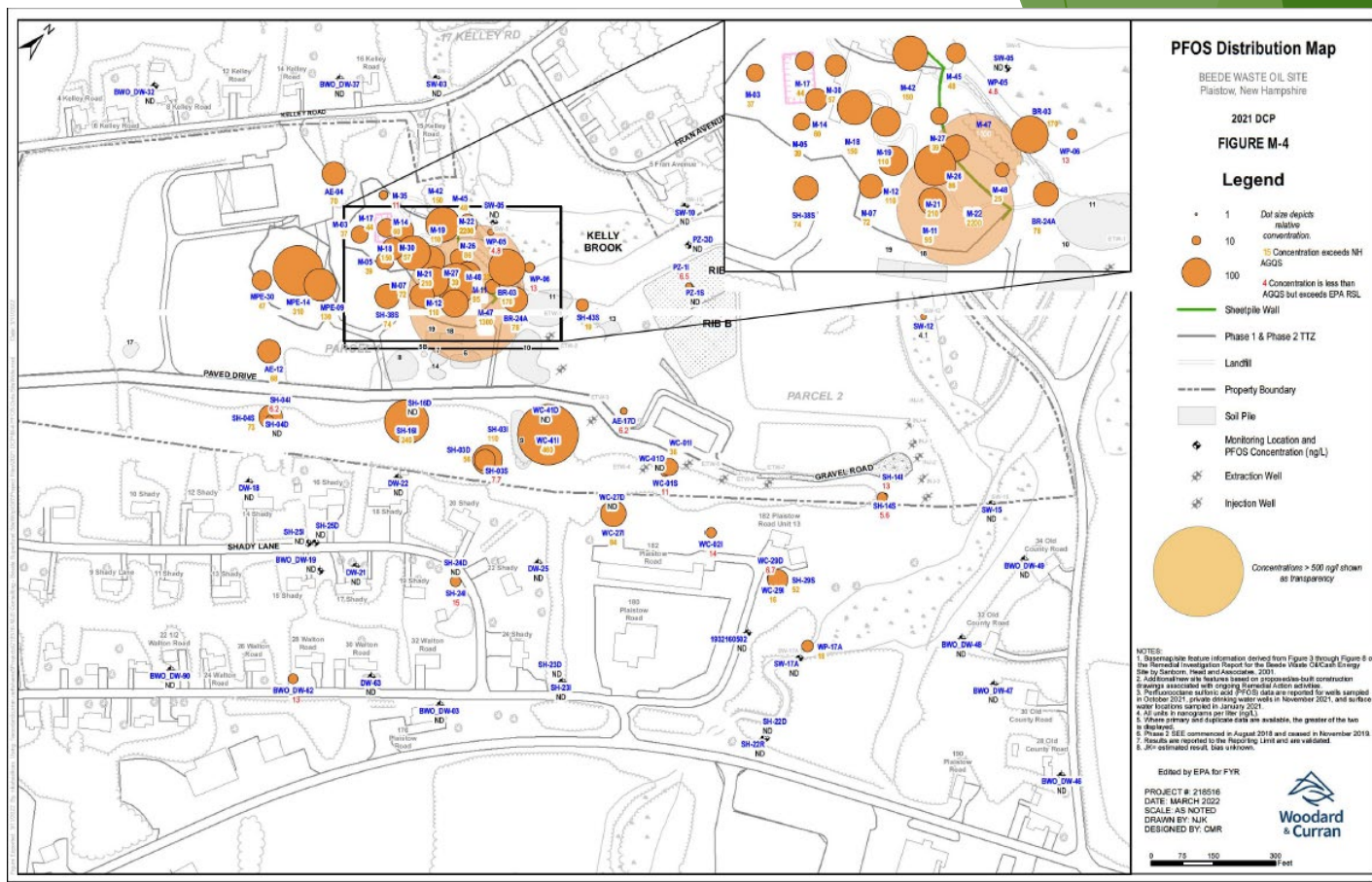
Current Site Conditions

- ▶ Thermal operations from the Phase 1 and Phase 2 source areas were very effective at the removal of LNAPL and VOCs from soil and groundwater; operation of the MOM groundwater system continues to decrease the concentrations and the extent of the shallow VOC plume.
- ▶ 1,4-dioxane is not widespread in shallow groundwater; concentrations have declined overall.
- ▶ 1,4-dioxane remains detected above the NH Drinking water standard in the intermediate and deep overburden and bedrock aquifers with the highest concentrations in bedrock wells located within the residential area.
- ▶ Concentrations of arsenic in groundwater are greatest in shallow groundwater within, and immediately downgradient of, the source areas (former Lagoon Area and the landfill/former UST/AST area).

Current Site Status Continued

- ▶ Per and polyfluorinated Substances (PFAS) have been analyzed since 2017.
- ▶ Concentrations are highest in on-property wells in areas associated with historical subsurface releases. The highest concentration of PFOS was 2200 ng/L post-thermal within the Phase 2 thermal area, followed by PFOA, whose highest concentration of 510 ng/L was detected within the lower landfill LNAPL, prior to the recent excavation of the lower landfill.
- ▶ PFOA and PFOS concentrations greater than EPA's screening levels and unacceptable risk-based levels for PFOA and PFOS are found outside of the targeted thermal areas and just over the property boundary within the residential area.
- ▶ No current residential water supply well exceeds the NH PFAS drinking water standard (AGQS).

Issues and Recommendations



Issue 1: 1,4-Dioxane and PFAS are continuing to migrate in the intermediate/deep overburden and bedrock and may not be captured by the current MOM system. PFAS concentrations in groundwater within and downgradient of the Beede properties exceed EPA RSLs and are over EPA risk-based levels.

Recommendation: Complete deep overburden and bedrock investigations to support a better understanding of the horizontal and vertical extent of 1,4-dioxane and PFAS in groundwater and potential migration pathways into the neighborhood; assess including as COCs and whether optimization of MOM is necessary.

Issue 2: LNAPL accumulation within former source areas

Recommendation: Continue removal of accumulated LNAPL via bailer, slurping, sorbent sock or belt skimmer; assess accumulation trends and potential impact to long term attainment of groundwater cleanup levels or site reuse; assess optimization, alternative actions or institutional controls, as needed.



Residual Oil

Issue 3 Re-evaluate risk from lead in soil

Recommendation: Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 $\mu\text{g}/\text{dL}$ which equated to the cleanup level set for soils of 400 ppm). Consider limiting exposure (child) to 5 $\mu\text{g}/\text{dL}$ which reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

Using updated parameters and a target BLL of 5 $\mu\text{g}/\text{dL}$, which equates to a site-specific lead soil screening levels (SLs) of 200 ppm, re-evaluate potential risks from lead exposure at the lower BBL.

These evaluations will determine whether any potential changes to the soil cleanup level in a decision document are required or would impact the extent of the contaminated shallow soil area to be addressed.

Issue 4: Establishment of a Groundwater Management Zone

Recommendation: Establish a GMZ in accordance with State of New Hampshire Code of Administrative Rules Env-Or 607 to monitor and manage groundwater use at the Site to prevent consumption of groundwater in excess of drinking water standards (AGQS) until cleanup levels are met.

Protectiveness Statement

Remedy is Protective in the short-term.

In order for the remedy to be protective at the completion of the remedial action the issues and recommendations must be completed, the soils excavation needs to be completed to meet criteria set in the ROD for future residential reuse and groundwater cleanup levels need to be achieved.