Tutu Wellfield Superfund Site

Proposed Cleanup Plan

Public Meeting

SCHEDULED

Thursday, August 23, 2018

7:00PM

Grace Gospel Chapel

St. Thomas, USVI

528394

Meeting Participants

- Cecilia Echols – EPA Community Involvement Coordinator
- Caroline Kwan – EPA Project Manager

Meeting Objectives

- EPA will present the conclusions of the Focused Source Remedial Investigation, Risk Assessment and Feasibility Study
- EPA will present and discuss the Proposed Plan for the cleanup of the contaminant source areas of the Tutu Site
- Public is encouraged to provide comments tonight and until Friday September 7, 2018

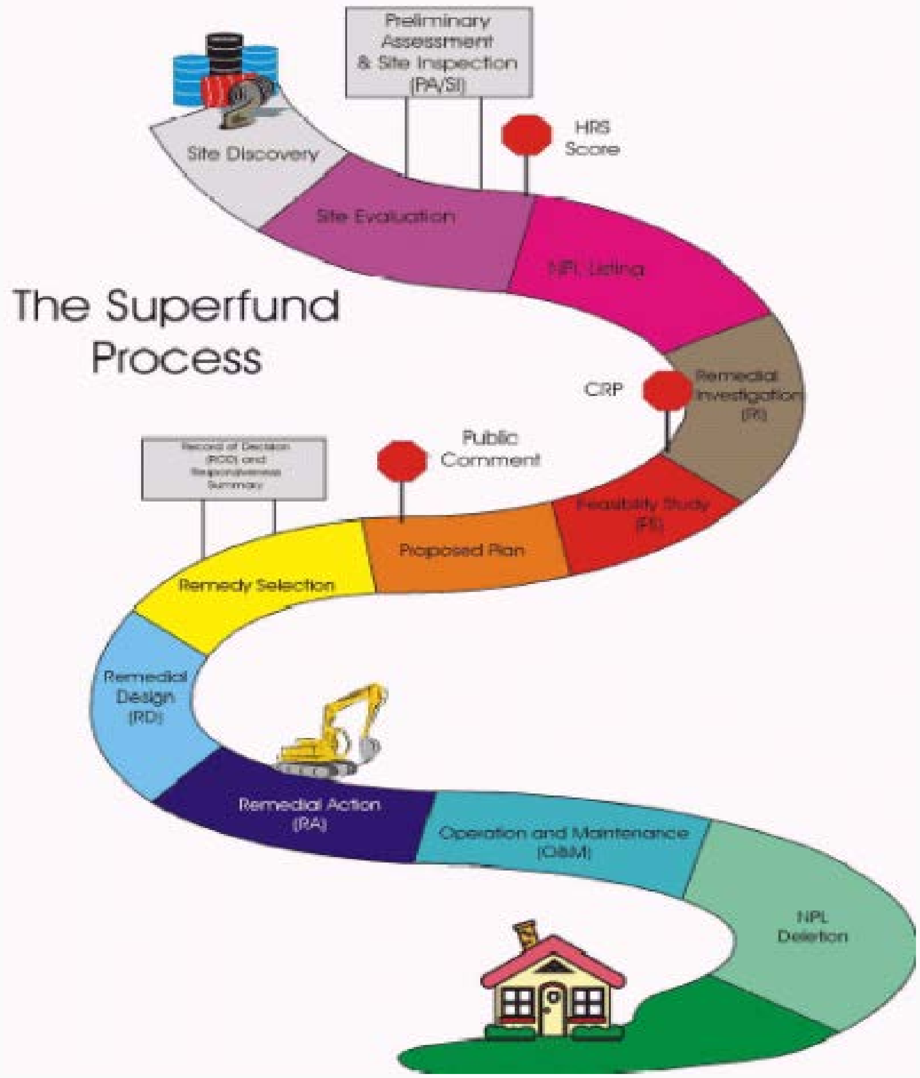
Meeting Agenda

- **Superfund Overview**
- Site Background
- Remedial Investigation
- Risk Assessment
- Feasibility Study
- Preferred Remedy
- Questions/Comments?

Superfund Law

- Toxic waste disposal disasters prompted law passage by Congress in 1980
- Provides Federal funds for cleanup of hazardous waste sites
- Allows EPA to respond to emergencies involving hazardous substances
- Empowers EPA to compel Potentially Responsible Parties to pay for or conduct site clean up

Superfund Cleanup Process



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Tutu Wellfield Superfund Site

Site History

- **1969 -** Curriculum Center property owned by LAGA Industries Ltd. (LAGA), a textile manufacturing facility
- **1970 to 1978 –** Purchased by Duplan Corporation and began dry cleaning operations using Tetrachloroethene (PCE)
- **1979 to 1981 -** Purchased by Panex, sold to VIDE
- **1982 to 2017 -** Multi-use building by VIDE

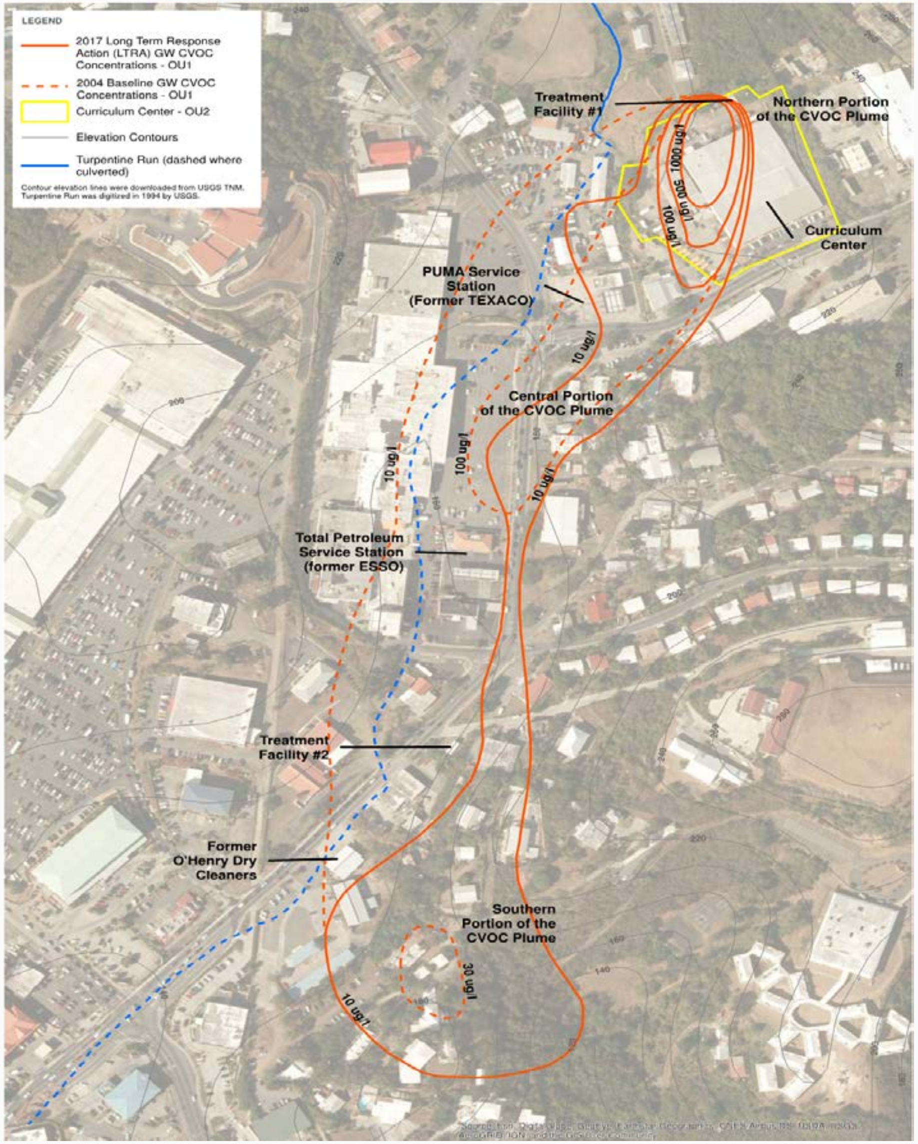
Site History

- **1982 to 1989 -** Multiple investigations by EPA and Potentially Responsible Parties (PRPs)
- **1994 to 1995 -** Remedial Investigation (RI) identified co-mingled plumes with chlorinated volatile organic compounds (CVOCs) and petroleum/gasoline components
- **September 1995 -** Site listed on the National Priorities List (NPL)
- Studies concluded that the CVOC plume with dichloroethene (DCE), tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride (VC) originated at or near the Curriculum Center

Site History

- **August 1996 -** Operable Unit 1 (OU1) Record of Decision (ROD) selected groundwater extraction and treatment to restore groundwater
- **2004 -** Construction of the remedy completed and included two groundwater treatment systems to treat the CVOC plume
- **2004 to 2013 -** Groundwater treatment facilities operated by EPA; transferred to USVI in 2013
- **April 2015 -** Operable Unit 2 (OU2) created by EPA to investigate potential additional contaminant source areas

Status of OU1 Remediation

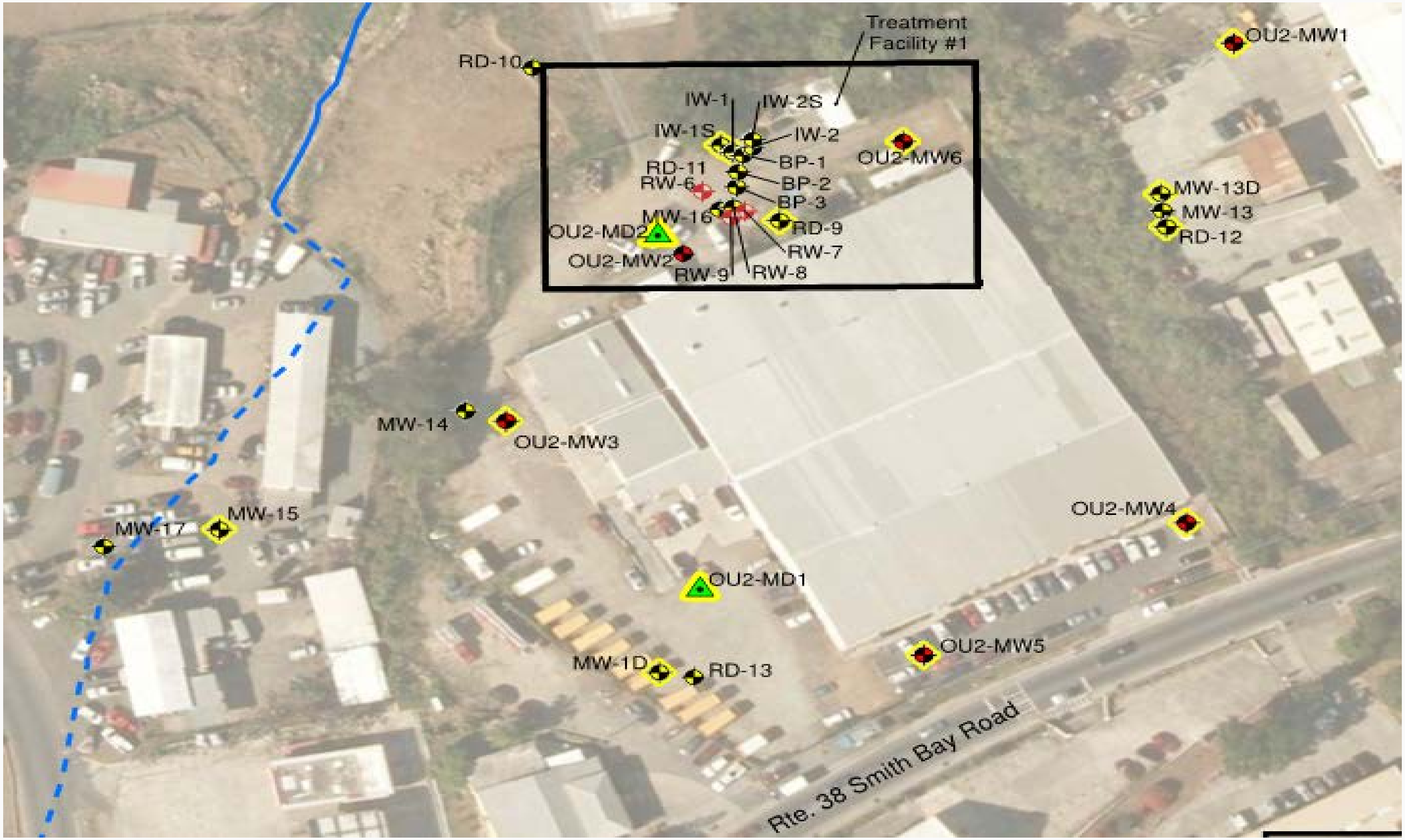


- Current Remedy: Groundwater extraction, ex-situ treatment, discharge to Turpentine Run, and institutional controls
- Groundwater treatment systems installed at the Curriculum Center property and near O'Henry Dry Cleaners
- SVE system installed at the Curriculum Center and operated from 2004 to 2006; significant decrease in influent concentrations
- Insufficient reduction of contamination at the Curriculum Center area

Meeting Agenda

- Superfund Overview
- Site Background
- **OU2 Remedial Investigation**
- Risk Assessment
- Remedial Alternatives
- Preferred Remedy
- Questions/Comments?

OU2 Study Area - Curriculum Center Property



OU2 Focused Source RI

Activities conducted at the Curriculum Center property

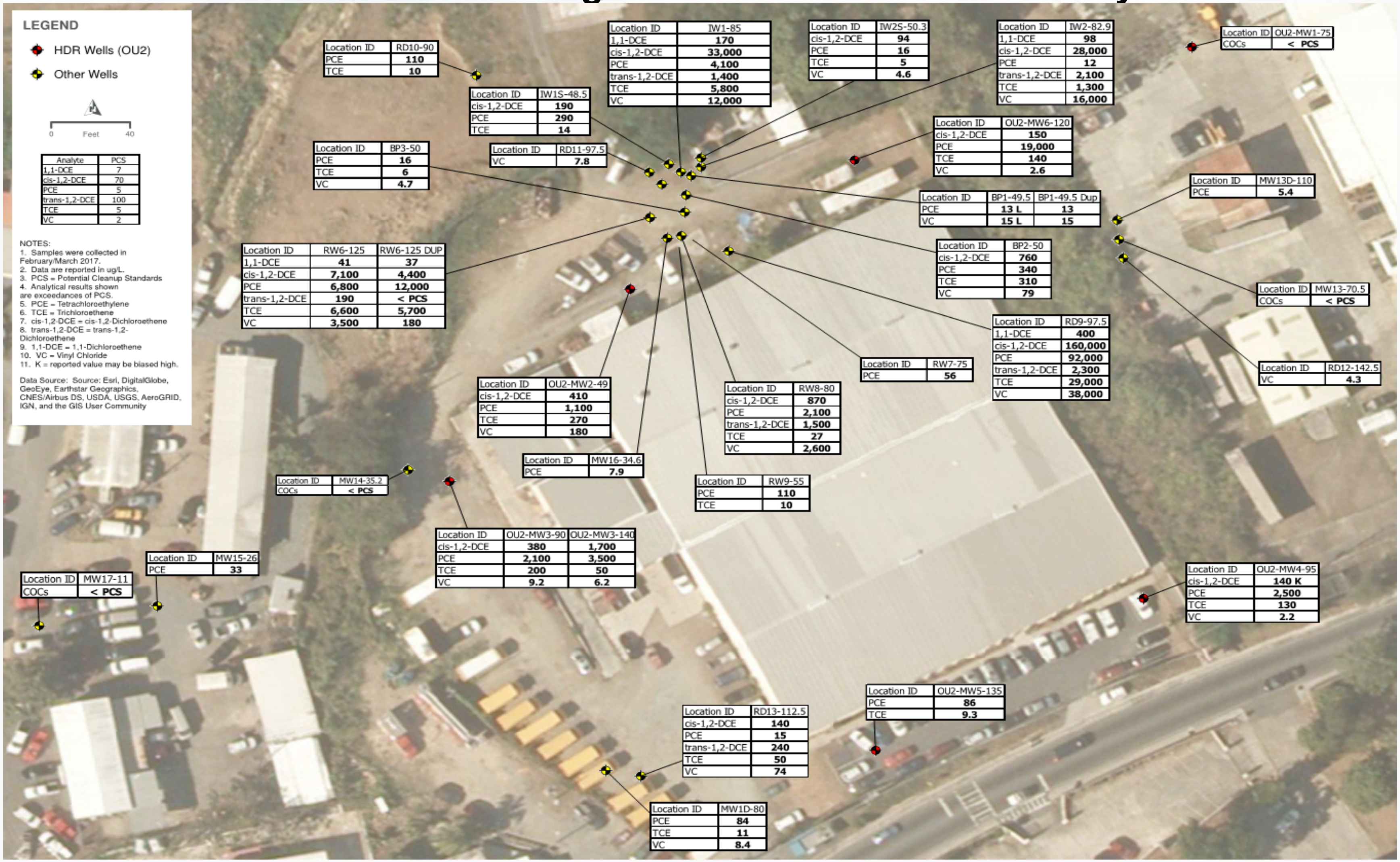
April 2016 to June 2017

- Surface geophysical survey
- Rock matrix diffusion sampling and analysis
- Monitoring well installation
- Borehole geophysical investigation
- Packer testing and sampling
- Groundwater sampling
- Groundwater level monitoring
- Dense non-aqueous phase liquid (DNAPL) monitoring

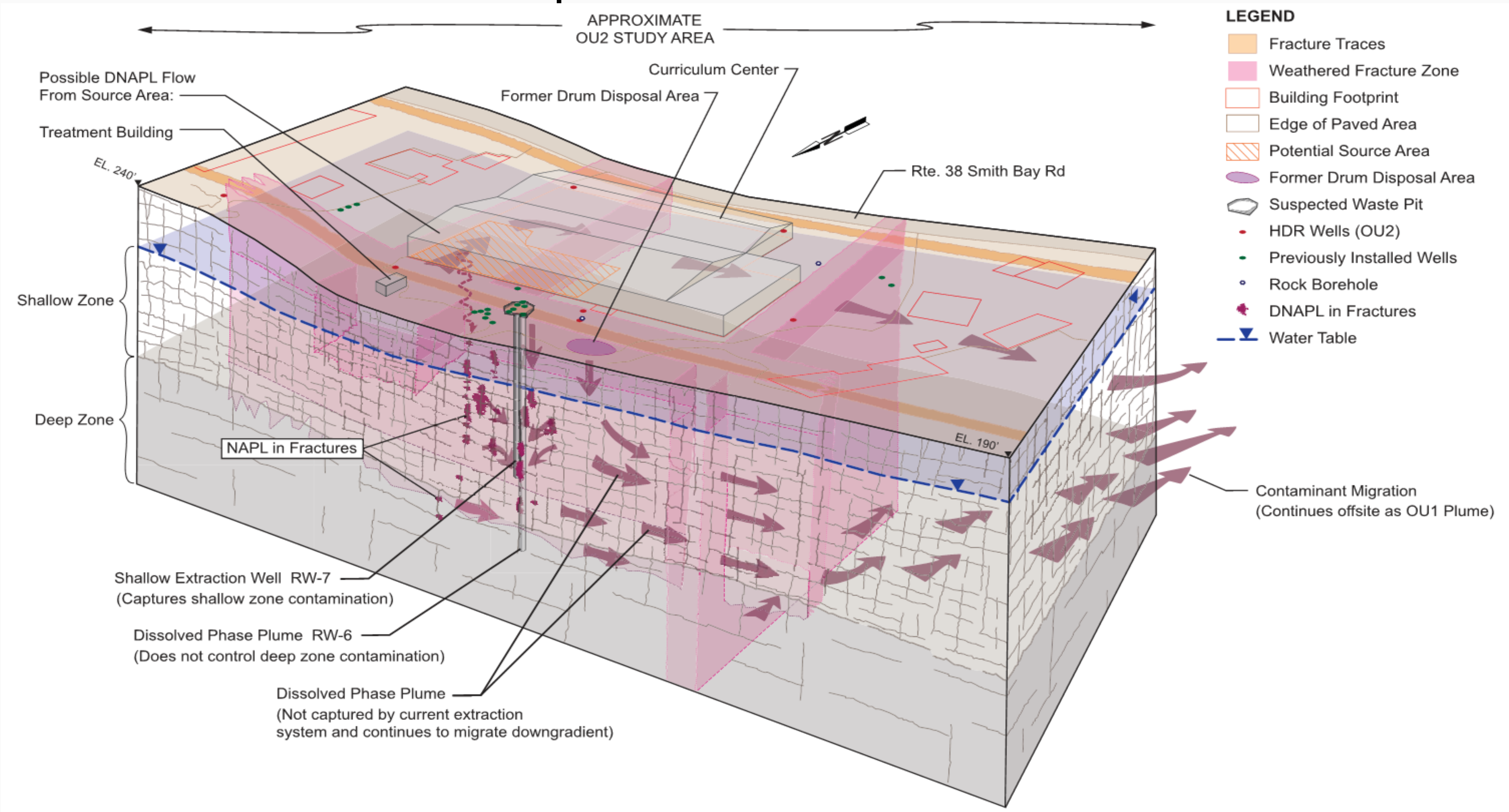
OU2 Groundwater Sampling Results

- Characterized bedrock aquifer; defined two hydraulically conductive zones
- DNAPL is present and will act as an ongoing source
- Dissolved phase CVOC contamination is present
- Contaminants present in the rock matrix will continue to back-diffuse into groundwater
- The degree of natural degradation varies throughout the Curriculum Center area
- The capture zone of the existing extraction system does not extend far enough in a downgradient direction

Monitoring Well Exceedances Summary



Conceptual Site Model



Meeting Agenda

- Superfund Process Overview
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- **Risk Assessment**
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OU2 Risk Assessment Process

- Step 1 — Hazard Identification
- Step 2 — Exposure Assessment
- Step 3 — Toxicity Assessment
- Step 4 — Risk Characterization

Drinking water use pathway
Source: Thinkstock Photos

OU2 Risk Assessment Summary

- Contaminated groundwater presents an unacceptable exposure risk.
- VC, TCE, PCE and *cis*-1,2-DCE pose a lifetime cancer risk exceeding $1x10^{-4}$
- Vapor intrusion from PCE and TCE are also of potential concern to workers
- Future use of the building is currently unknown

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Remedial Alternatives – Cleanup Options

- **Alternative 1** – No Action
- **Alternative 2** – Expand Existing Pump and Treat System

➢ **Alternative 2A** – Reinjection

➢ **Alternative 2B** – Air Sparging/ Soil Vapor Extraction (AS/SVE)

➢ **Alternative 2C** – In Situ Chemical Oxidation (ISCO)

➢ **Alternative 2D** – Surfactant Flushing

Remedial Alternatives – Cleanup Options (continued)

- **Alternative 3** – In Situ Thermal Treatment and Pump and Treat
- **Alternative 4** – In Situ Steam Injection and Pump and Treat

Alternative 1 – No Action

- No Action to remediate the contaminated groundwater
- No Institutional Controls

Pros – Basis for comparison with other process options

Cons – Contaminants in groundwater will continue to spread. Human health and environmental risks remain

Costs-

- *Capital Cost:* $0
- *Annual operations and maintenance (O&M) Costs:* $0
- *Present-Worth Cost:* $0

Remedial Alternatives – Common Elements for Alternatives 2, 3 and 4

- Pre-Design Investigation (PDI)
- Institutional Controls
- Upgrade the current system
- Long-term monitoring until clean up levels are achieved
- Site Management Plan
- Five Year Reviews

Alternative 2 – Expand Existing Pump and Treat System

- Expand existing system, add 2 new extraction wells downgradient
- Upgrade current system capacity
- Replace existing equipment
- Alternate pumping from source area wells
- Dual-phase extraction (DPE) / enhanced fluid recovery (EFR) from source area wells

Pros - containment of plume; removal of DNAPL

Cons - remedial timeframes are long

Timeframe-

- Estimated to be in excess of 30 years;
- Pump and treat (P&T) and long term monitoring (LTM) costs estimated for 30 years.

Costs-

- *Capital Cost:* $4,616,924
- *Annual operations and maintenance (O&M) Costs:* $7,600,039
- *Present-Worth Cost:* $12,273,313

Alternative 2A – Reinjection

Enhancement of Alternative 2 with reinjection of treated water downgradient through 2 new injection wells

Pros- better hydraulic control and maintaining water balance

Cons - additional hydrogeological analysis needed; reinjection wells will need maintenance; long remedial timeframes

Timeframe -

- Estimated to be in excess of 30 years;
- P&T and LTM costs estimated for 30 years.

Costs-

- *Capital Cost:* $425,260
- *Annual O&M Costs:* $51,364 plus Alt 2
- *Present-Worth Cost:* $476,624

Alternative 2B – AS/SVE

Enhancement of Alternative 2 with air sparging and soil vapor extraction (AS/SVE) in source areas; add 25 SVE and 30 AS wells

Pros- mobilize residual DNAPL within the zone influenced by air sparging; may increase the mass removal rate reducing the timeframe of the P&T system

Cons- air flow may not be uniform, depends on how well the injected air permeates from injection point, connectivity of fractures and groundwater mounding

Timeframe-

- The AS/SVE system at source area for 5 years;
- Based on calculations, downgradient area will reach drinking water standards in 25 years;
- LTM costs estimated for 30 years

Costs -

- *Capital Cost:* $1,710,790
- *Annual O&M Costs:* $169,501 plus Alt 2
- *Present-Worth Cost:* $1,880,291

Alternative 2C – ISCO

Enhancement of Alternative 2 with in situ chemical oxidation (ISCO) cylinders in select source area wells; 64 cylinders in 12 monitoring wells; replaced yearly

Pros- passive treatment for source area concentrations; less expensive

Cons - will affect the bioactivity in the aquifer

Timeframe -

- ISCO at source area for 5 years;
- Based on calculations, downgradient from treated source area will reach drinking water standards in 25 years;
- LTM estimated for 30 years

Costs-

- *Capital Cost:* $93,920
- *Annual O&M Costs:* $98,620 plus Alt 2
- *Present-Worth Cost:* $192,540

Alternative 2D – Surfactant Flushing

Enhancement of Alternative 2 with surfactant flushing in source areas; 2 deep injection wells, 5 shallow injection wells

Pros - removal of source area concentrations and DNAPL

Cons- effective only if there is contact; ability of the formation to accept a sufficient volume of surfactant solution is unknown

Timeframe -

- Surfactant flushing at source area for 1 year;
- Based on calculations, downgradient from treated source area will reach drinking water standards in 25 years;
- LTM estimated for 26 years.

Costs -

- *Capital Cost:* $1,222,799
- *Annual O&M Costs:* Same as Alt 2
- *Present-Worth Cost:* $1,222,799

Alternative 3 – In Situ Thermal Treatment and Pump and Treat System

- In situ thermal treatment to target DNAPL in source areas and pump and treat for hydraulic control; 260 to 270 heater wells, co-located with 260 to 270 vacuum extraction points
- Add 2 downgradient extraction wells and upgrade the current treatment system capacity and equipment

Pros - ability to penetrate fractured rock matrix and to treat DNAPL and CVOCs

Cons - high capital costs

Timeframe -

- Thermal at source area for 2 years;
- Based on calculations, downgradient from treated source area will reach perimeter P&T wells in 10 years;
- LTM estimated for 12 years.

Costs-

- *Capital Cost:* $79,015,003
- *Annual O&M Costs:* $4,094,323
- *Present-Worth Cost:* $83,221,216

Alternative 4 – In Situ Steam Injection and Pump and Treat

- In situ steam injection in source areas to release DNAPL with pump and treat for hydraulic control, 60 steam injection wells and 30 multi-phase extraction wells
- Add 2 downgradient extraction wells and upgrade the current treatment system capacity and equipment

Pros - mobilize DNAPL which will be captured by the extraction wells

Cons - effectiveness of steam injection relies on its ability to contact, heat, and physically displace contaminants; high capital costs

Timeframe-

- Steam treatment at source area for 2 years;
- Based on calculations, downgradient from treated source area will reach drinking water standards in 25 years;
- LTM estimated for 27 years

Costs-

- *Capital Cost:* $23,541,419
- *Annual O&M Costs:* $7,169,229
- *Present-Worth Cost:* $30,773,828

EPA's Nine Criteria for Selecting Cleanup Plans

EPA uses nine criteria to evaluate remedial alternatives presented in the Feasibility Study and choose which to implement

Threshold Criteria

1. Overall Protection of Human Health and the Environment: Will the plan protect people and the plant and animal life on and near the Site? EPA cannot and will not choose a plan that does not meet this basic criterion.
2. Compliance with Applicable or Relevant and Appropriate Requirements: Does the alternative meet all federal and state environmental statutes, regulations and requirements? The chosen cleanup plan must meet this criterion.

Balancing Criteria

3. Long-Term Effectiveness and Permanence: Will the effects of the cleanup last or could it be ineffective and cause future risks?

4. Reduction in Toxicity, Mobility or Volume through Treatment: Does the alternative reduce the harmful effects, spread of, and amount of the contaminated material?

5. Short Term Effectiveness: How soon will site risks be reduced? Could the cleanup cause short-term hazards to workers, residents or the environment?

6. Implementability: Is the alternative technically feasible? Are the right goods and services (i.e. treatment machinery, space at an approved disposal facility) available to complete the plan?

7. Cost: What is the total cost of an alternative over time? EPA must choose a plan that gives necessary protection at reasonable cost.

Modifying Criteria

8. State/Territory Acceptance: Do state/territory environmental agencies agree with EPA's proposal?

9. Community Acceptance: Acceptance of preferred alternative by the impacted community will be assessed following the public comment period. Provide your comments.

Remedial Alternatives Cost Estimates

Alternative	Capital Cost	Annual Operation & Maintenance	Periodic Cost	Total Present Value
1 – No Action	$0	$0	$0	$0
2 – Expand Existing Pump and Treat	$4.6 million	$433,315 (Years 1 to 30)	$176,750 (Year 30)	$12.2 million
2A – Reinjection	$425,260	$11,500 (Years 1 to 30)*	Same as Alt 2 (Year 30)	$476,624 **
2B – AS/SVE	$1,710,790	$37,950 (Years 1 to 5)*	Same as Alt 2 (Year 30)	$1,880,291**
2C – ISCO	$93,920	$22,080 (Years 1 to 5)*	Same as Alt 2 (Year 30)	$192,540**
2D – Surfactant Flushing	$1,222,799	Included in Alt 2 (Years 1 to 26)	Included in Alt 2 (Year 26)	Included in Alt 2
3 – In Situ Thermal Treatment and Pump and Treat	$79,015,003	$433,315 (Years 1 to 12)	$176,750 (Year 12)	$83,221,216
4 – In Situ Steam Injection and Pump and Treat	$23,541,419	$433,315 (Years 1 to 27)	$176,750 (Year 27)	$30,773,828

Meeting Agenda

- Superfund Overview
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- Remedial Alternatives
- **Preferred Remedy**
- Questions/Comments

Preferred Remedy - Alternative 2 , Expand Existing Groundwater Extraction and Ex-Situ Treatment (Pump and Treat) with Alternative 2A, Reinjection

- Expansion of the existing pump and treat system to include downgradient extraction wells;
- Upgrade pump and treat system to higher flow rate;
- Upgrade all treatment equipment to accommodate additional flow and improve efficiency;
- Reinjection of treated water;
- Alternate pumping from existing monitoring wells with high contaminant concentrations;
- Dual phase extraction from source area wells; and
- Long-term groundwater monitoring.

Contingency Remedy - Alternative 2 , Expand Existing Groundwater Extraction and Ex-Situ Treatment (Pump and Treat) with Alternative 2B, AS/SVE

- Expansion of the existing pump and treat system to include downgradient extraction wells;
- Upgrade pump and treat system to higher flow rate;
- Upgrade all treatment equipment to accommodate additional flow and improve efficiency;
- Air Sparging/SVE at source areas and
- Long-term groundwater monitoring.

Questions and Comments?

Please address written comments no later than

Friday, September 7, 2018 to:

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Thursday, August 23, 2018

Thank you!

https://www.epa.gov/superfund/tutu-wellfield