Thermally Enhanced Soil Vapor Extraction (TESVE) to Simultaneously Treat Eight Separate Source Areas: Dunn Field, Defense Depot (DLA), Memphis, TN

Site Information: The Defense Depot in Memphis Tennessee (DDMT) was an active facility from 1942-1997. It was selected for closure under the Base Realignment and Closure (BRAC) Act in July 1995. A record of decision (ROD) was issued April 2004 with the following elements: (1) Soil remedies included excavation of former disposal sites and soil vapor extraction (SVE), (2) a groundwater remedy included Zero-Valent Iron (ZVI) injections and a ZVI Permeable Reactive Barrier (PRB), and a Monitored Natural Attenuation (MNA), and (3) land use controls.

Original Dunn Field Remedial Approach:

- ZVI injection design, which included 44 injection locations throughout the groundwater plume at Dunn Field.
- Fluvial SVE (in vadose zone sands): Began operations in July 2007 and was expected to continue until 2012 but had only removed 3,900 pounds (1,800 kg) of contamination in two years (through July 2009).
- SVE field studies and additional soil investigations led to changes in selected remedy, a ROD Amendment: The use of thermal enhanced SVE in loess (silty clay soil in vadose zone) at Dunn Field.

TESVE Approach:

- As depicted in the figure below, TESVE treated silty-clay soil to 30 ft (9 m) depth.

Results:

- 49,800 cubic yards (cy [38,000 m³]) treated
- Removed 12,500 lbs (5,700 kg) of contamination from soil (previous studies had estimated 9,000 to 14,000 lbs (4,100 to 6,350 kg) of contamination present).
- Confirmation sample results met clean-up standards.
- Awarded the 2009 Secretary of Defense Environmental Award.

Approach:

- In Situ Thermal Desorption (ISTD)
- Source areas: 8
- Target temperature: 90-110°C
- Spacing between wells: 17 ft (5 m)
- Thermal wells: 367
- Vacuum extraction wells: 68

Funded by the United States Air Force (USAF)

For further information:

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Heating Method:
In Situ Thermal Desorption (ISTD)

Location: Memphis, TN

Time Frame:
ISTD system operated from May 2008 until December 2009 (6 months of heating).

Project Costs:
$3.9 M which equals $79/cy

Site Released for Redevelopment

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CVOC Concentrations in Soils before and after ISTD

<table>
<thead>
<tr>
<th>Source Area</th>
<th>Governing Contaminants</th>
<th>Max. soil concentration before (mg/kg)</th>
<th>Max. soil concentration after (mg/kg)</th>
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<tr>
<td>1A</td>
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All Areas Met Target Criteria, Under Guaranteed Performance Contract.

Received the 2009 Secretary of Defense Environmental Award - the only award given this year within the Environmental Restoration category

Thermal Enhanced Soil Vapor Extraction was cited as a “key component of the program’s successes.”

- “In addition to meeting the established goals ahead of schedule, the program saved taxpayers more than $2.5 million.” (Defense Logistics Agency Press Release 4/27/2009)

Rationale for Cost Savings:
- After successful implementation of soil remedies, groundwater contamination did not require additional cleanup.
- ZVI injections were not performed at a savings of $2,200,000 for the injections and $6,00,000 for associated groundwater monitoring.
- All extraction system wells shut-down as of January 2009 at an annual savings of $140,000.