White Sands Missile Range

Systematic Diesel Spill, SWMU 154

HELSTF - REMEDIATION
PROJECT

VACUUM ENHANCED
DIESEL RECOVERY SYSTEM

A.S.I. / Tetra Tech
• ASI is the Environmental Services Contractor for WSMR

• HELSTF Project Team Members:
  ✔ A.S.I.
  ✔ Tetra Tech, Inc.
  ✔ XiTech, Inc.
  ✔ Northwestern Carbon
  ✔ Baker Furnace, Inc.

• Why was the A.S.I. Team selected for the HELSTF - Remediation Project
  ✔ Experience
  ✔ Cost
Presentation Overview

Systemic Diesel Spill, SWMU 154

- Site Background
  - Why is this an IRM site vs. RFI / CMS site
- Site History
- Main Construction Phases
- System Design Features
- Air Treatment System
  - Activated Carbon vs. Thermal Destruction
- Diesel Product Extraction
  - Product Skimming vs. Total Fluids Extraction
- What’s Next?
Project Background

Systemic Diesel Spill, SWMU 154

- Diesel spill discovered June 1990

- Multiple RFI investigations underway at HELSTF
  - chrome spill (SWMU 143)
  - solvent spill (SWMU 142)
  - diesel spill (SWMU 154)

- New Mexico, Environment Department (NMED)
  Groundwater Section requested expedited free-product removal
## Site History

### Systemic Diesel Spill, SWMU 154

## Sequence of Events

**Systemic Diesel Spill Investigation**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>30,000 gallon diesel UST installed</td>
</tr>
<tr>
<td>1980 - 1988</td>
<td>Product releases suspected from product line failure and UST overfilling</td>
</tr>
<tr>
<td>April 1988</td>
<td>UST Removal</td>
</tr>
<tr>
<td>April 1990</td>
<td>Detection of diesel product during Cleaning Facility sump investigation</td>
</tr>
<tr>
<td>1991 - 1992</td>
<td>Installed 2 wells / 17 borings to assess diesel plume</td>
</tr>
<tr>
<td>May - June 1993</td>
<td>Installed two RCRA monitoring wells for long-term Cleaning Facility monitoring</td>
</tr>
<tr>
<td>May 1993</td>
<td>Completed 4 borings, 4 piezometers &amp; 4 wells to delineate diesel plume</td>
</tr>
<tr>
<td>June 1993</td>
<td>Pilot test conducted - LNAPL Skimming Test and Vacuum Enchanced Pumping Test</td>
</tr>
</tbody>
</table>
AREAS OF REPORTED DIESEL RELEASE

LEGEND

- LOCATION OF REPORTED PIPELINE LEAK
- LOCATION OF 30,000 GALLON REMOVED DIESEL TANK
- LOCATION OF DIESEL PIPELINE ROUTING
Wells Installed During RFI

Systemic Diesel Spill, SWMU 154

LEGEND

EXISTING MONITORING WELLS
○ EXISTING PIEZOMETER WELLS (LT.)
★ LOCKHEED INSTALLED WELL
△ I.T. CORP. INSTALLED WELL
++ ASI INSTALLED WELL

APPROXIMATE SCALE
Wells Monitoring Data

SWMU 154 - SYSTEMIC DIESEL
Monitoring Well Summary

<table>
<thead>
<tr>
<th>Contractor / Date installed</th>
<th>Well I.D.</th>
<th>Diameter of Casing</th>
<th>Screened Interval</th>
<th>Date Surveyed</th>
<th>Depth to LNAPL</th>
<th>Depth to Water</th>
<th>Product Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockheed - 6/90</td>
<td>HCF-1</td>
<td>4-inches</td>
<td>37’ - 57</td>
<td>7/94</td>
<td>40.38 ft</td>
<td>42.90 ft</td>
<td>12.00 ft</td>
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<td></td>
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<td></td>
<td></td>
<td>NR</td>
<td>NR</td>
<td>2.52 ft</td>
</tr>
<tr>
<td>Lockheed - 6/92</td>
<td>HCF-2</td>
<td>4-inches</td>
<td>35’ - 55</td>
<td>5/93</td>
<td>35.14 ft</td>
<td>35.24 ft</td>
<td>0.52 ft</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7/94</td>
<td>36.13 ft</td>
<td>38.55 ft</td>
<td>0.10 ft</td>
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<tr>
<td>Lockheed - 6/92</td>
<td>HCF-3</td>
<td>4-inches</td>
<td>35 - 55</td>
<td>6/92</td>
<td>NR</td>
<td>NR</td>
<td>2.64 ft</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5/93</td>
<td>35.50 ft</td>
<td>35.95 ft</td>
<td>0.91 ft</td>
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<tr>
<td>ASI - 6/93 2</td>
<td>HCF-4 / CFW-4</td>
<td>4-inches</td>
<td>35’ - 55</td>
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<td>7/94</td>
<td>40.19 ft</td>
<td>46.64 ft</td>
<td>6.45 ft</td>
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<tr>
<td>IT Corp. - 5/93</td>
<td>HCF-5</td>
<td>4-inches</td>
<td>35.5’ 55.5</td>
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<td>51.04 ft</td>
<td>10.60 ft</td>
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<td>7/94</td>
<td>40.19 ft</td>
<td>46.64 ft</td>
<td>6.45 ft</td>
</tr>
<tr>
<td>ASI - 5/93 2</td>
<td>HCF-6 / CFW-1</td>
<td>4-inches</td>
<td>35’ - 55</td>
<td>7/94</td>
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<td>7/94</td>
<td>40.19 ft</td>
<td>46.64 ft</td>
<td>6.45 ft</td>
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<tr>
<td>IT Corp. - 5/93</td>
<td>HCF-7</td>
<td>4-inches</td>
<td>34.5’ 54.5’</td>
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<td>40.82 ft</td>
<td>54.02 ft</td>
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<td>40.60 ft</td>
<td>55.21 ft</td>
<td>14.61 ft</td>
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<td>IT Corp. - 5/93 2</td>
<td>HCF-8 / CFW-3</td>
<td>4-inches</td>
<td>34’ - 54</td>
<td>6/93</td>
<td>NPM 3</td>
<td>40.90 ft</td>
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<td>7/94</td>
<td>40.82 ft</td>
<td>41.32</td>
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<tr>
<td>IT Corp. - 5/93 2</td>
<td>HCF-9 / CFW-2</td>
<td>4-inches</td>
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<td>5/93</td>
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<td>42.31 ft</td>
<td>42.32 ft</td>
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<td>IT Corp. - 5/93</td>
<td>HCF-10 / HMW-10</td>
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<td>NPM 3</td>
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<td>IT Corp. - 6/93</td>
<td>PZ-1</td>
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<td>35’ - 55</td>
<td>7/94</td>
<td>NPM 3</td>
<td>39.63 ft</td>
<td>0.00 ft</td>
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<tr>
<td>IT Corp. - 6/93</td>
<td>PZ-2</td>
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<td>PZ-3</td>
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<td>IT Corp. - 6/93</td>
<td>PZ-4</td>
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<td>IT Corp. - 6/93</td>
<td>HMW-13</td>
<td>2-inches</td>
<td>NR</td>
<td>7/94</td>
<td>NPM 3</td>
<td>37.42 ft</td>
<td>0.00 ft</td>
</tr>
</tbody>
</table>
Est. Extent of LNAPL Plume

Systemic Diesel Spill, SWMU 154

LEGEND
- Cross Section
- Product Thickness Contour in Feet

[Diagram showing the estimated extent of LNAPL plume with various points and labels such as HCF-3, HCF-4, CFW-3, etc., and a direction arrow from A to A'].
This diagram depicts interpreted product thickness relationships beneath the site based on the selected wells shown.
Extraction Well Locations

Systemic Diesel Spill, SWMU 154

LEGEND

- Extraction Well Locations
- Monitoring Well Locations
- Estimated LNAPL Thickness Contours in Feet

APPROXIMATE SCALE
Subsurface Pressure Distribution Chart

SUBSURFACE PRESSURE DISTRIBUTION (t=600min)
SYSTEMIC DIESEL SPILL AREA - 154
HELSTEF CLEANING FACILITY
WHITE SANDS MISSILE RANGE, NEW MEXICO

Pressure in inches of H₂O (1" H₂O = 13.59 in² H₂O)

Distance from Extraction Well (ft)

(I.T. CORP, 1993)
Vacuum Enhanced Zone of Influence

LEGEND

- VACUUM ENHANCED ZONE OF INFLUENCE FROM CENTER OF WELL AT 15" M
- EXISTING WELL
- PROPOSED WELL
- VACUUM ENHANCED WELL

Systemic Diesel Spill, SWMU 300
- **Purpose of VEDRS**
  - Extraction of diesel from groundwater
  - Effect rapid diesel accumulation in recovery wells
  - Minimize influence on adjacent plumes

- **Primary System Components**
  - Product only skimming pumps
  - Aboveground storage tank
  - Vacuum extraction system

- **Safety Features**
  - 100% secondary containment of liquids;
    - double-walled piping
    - double-walled tank
  - Interstitial monitoring of piping
  - Interstitial monitoring of tank
  - Automatic system shutdown if;
    - Liquid sensor in AST or piping activated
    - High-level tank sensors activated
    - VOC's >100 ppm detected at air discharge
  - Auto-dialer alarm notification system
LNAPL Recovery Flow Diagram

Systemic Diesel Spill, SWMU 154
Vacuum Enhanced Flow Diagram

Systemic Diesel Spill, SWMU 134

[Diagram of vacuum enhanced flow system with various components labeled, including vacuum supply, timer, holding tank, vacuum manifold, skimming pump, recovery drum, floating hydrophobic filter, monitoring well, and more.]
Proposed Equipment Location

Systemic Diesel Spill, SWMU 154
Operational Summary

11 Product Extraction Wells
(7 recovering product)

5 Vacuum Enhanced Recovery Wells
(vacuum applied to 4 wells)

Vacuum applied at 2" Hg @ 15 cfm

- System Performance
  - Reduced product from 2' to < 2" in HCF-1, HCF-2 and HCF-3
  - Vacuum increased product recovery into core extraction wells
  - Application of vacuum yields rapid recovery of product in core wells
    - Operational Evaluation of HCF-7
    - Initially 14' product recovered in 1 day
    - Slow recovery without vacuum ~ 2" in 2 days
    - Application of 2" Hg yields 5' product in 12 hours

Systemic Diesel Spill, SWMU 154
• Completion of RFI to Delineate Contaminant Plumes at:

  ✓ SWMU 154 - System Diesel Spill
     - determine extent of dissolved plume
     - delineate residual vadose zone contamination

  ✓ SWMU 142 - Solvent Spill
     - determine extent of dissolved plume
     - delineate presence of DNAPLs
     - delineate / characterize vadose zone contamination

  ✓ SWMU 143 - Hexavalent Chromium Spill
     - determine extent of groundwater contamination
     - determine extent of soil contamination

• Complete a CMS on Delineated Contaminant Plumes;

  ✓ SWMU 154 - Systemic Diesel Spill
     - evaluate necessity of further remediation based on fate and transport modeling and health based risk assessment
     - evaluate remedial alternatives for meeting risk based cleanup goals

  ✓ SWMU 143 - Hexavalent Chrome Spill
     - evaluate transport and fate of the plume
     - evaluate remedial alternatives, including natural attenuation of hexavalent chrome in groundwater and soil

• Evaluate SWMUs as a CAMU

  ✓ allow continuity and economies from joint RFI / CMS