Management and Monitoring Approach

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Why Develop this Approach?

• Long Term Management Costs

• Power in Decision Making
  • Consistent High Quality Information
  • Transparency Promotes Understanding
  • Document Sampling Strategy and Methods
  • Site Closure Requirements

• Smart Tool
  • Tells the Story of the Site
  • Captures Past Actions and Agreements
  • Reinforces Exit Strategy

Source: NAVFAC NORM Database Spring 2011
Introduction

1. Introduction

This Remedial Action Operations and Long-Term Monitoring (LTM) Report presents the Year 12/Round 16 groundwater and ecological monitoring activities completed at Site 1, Landfill at Oyster House Creek for Naval Radio Transmitting Facility (NRTF) Driver, located in Suffolk, Virginia facility. The LTM at Site 1 is required in accordance with the selected remedy identified in the Record of Decision (ROD) signed in September 1997. This Remedial Action Operations and report was prepared by the Naval Facilities Engineering Command (NAVFAC) for submittal to the U.S. Navy and the Virginia Department of Environmental Quality (VDEQ).

1.1 Objective

The LTM being conducted at Site 1 evaluates whether contamination has migrated outside the landfill boundary and if the selected remedy—Institutional Controls (ICs) (site restrictions with LTM)—remains protective of human health and the environment.

The objectives of this report are to:

- Present the results for Round 16 of Site 1’s LTM Program
- Evaluate these results through trend analysis of all 16 rounds of data collected over the past 12 years
- Better define metrics used to evaluate whether Remedial Action Objectives (RAOs) have been met at the site
- Present an exit strategy for LTM at Site 1 and describe the site’s progress toward closure

1.2 Organization

The LTM Report is organized as follows:

Section 1 – Introduction
   Section 2 – Site Background
Conceptual Site Model - NRTF Driver Site 1, Landfill at Oyster House Creek

- Hypothetical Future Construction Workers – As calculated in the RI, a non-cancer hazard of 0.7 exists to this receptor from dermal contact with shallow groundwater.

Summary of calculated risks and hazards to the Hypothetical Future Construction Worker:

The risk to hypothetical future construction workers are shown to illustrate all land use scenarios evaluated in the RI, regardless of probability. However, the land use at the site (i.e., wildlife refuge) is unlikely to change.

U.S. Navy
Conceptual Site Model

FIGURE 4
Conceptual Site Model - NRTF Driver Site 1, Landfill at Oyster House Creek

U.S. Navy

4 B
FIGURE 4  (Enlarge)  (View as PDF)  (Historical CSM [1970])
Conceptual Site Model - NRTF Driver Site 1, Landfill at Oyster House Creek
TABLE 4-1
Site 3 - Previous Investigations and Remedial Actions

<table>
<thead>
<tr>
<th>Methods</th>
<th>Date</th>
<th>Activities</th>
<th>Admin. Record No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remedial Investigation (RI) (Baker)</td>
<td>1996</td>
<td>Evaluated the nature and extent of contamination. VOCs (particularly fuel constituents) and SVOCs (primarily PAHs) were detected in groundwater within the surficial and Castle Hayne aquifers. SVOCs were identified in both the surface and subsurface soil, particularly within the creosote treatment area. The human health risk assessment (HHRA) identified potential risks to future residential children and adults due to exposure to the following SVOCs in groundwater: benz(a)pyrene, benz(a)anthracene, dibenzofuran, phenanthrene, and acenaphthene.</td>
<td>001699 and 001700</td>
</tr>
<tr>
<td>FS (Baker)</td>
<td>1996</td>
<td>Following an evaluation of remedial alternatives for both soil and groundwater, the following two-part alternative was selected: Source removal with onsite biological treatment of PAH-contaminated subsurface soils. Monitored natural attenuation (MNA) with LUCs for groundwater.</td>
<td>001721</td>
</tr>
<tr>
<td>ROD (Baker)</td>
<td>1997</td>
<td>Established Remedial Action Objectives (RAOs) and defined the selected remedy. The RAOs were: – Prevent leaching of PAH contaminants from subsurface soil to the groundwater. – Remediate subsurface soil and shallow groundwater. – Prevent exposure to contaminant groundwater.</td>
<td>001753</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Method</th>
<th>Date</th>
<th>Activities</th>
<th>Admin. Record No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTM</td>
<td>1998</td>
<td>LTM monitoring began.</td>
<td>NA</td>
</tr>
<tr>
<td>TSI</td>
<td>1998</td>
<td>Biological treatment of PAH-contaminated subsurface soil was tested. The study indicated that biological treatment was not effective.</td>
<td>NA</td>
</tr>
<tr>
<td>Amended ROD (DoN)</td>
<td>2000</td>
<td>Based on the results of the 1998 Treatability Study, the remedy was amended: to remove biological treatment of soils. Soil excavation with offsite disposal was chosen to address source removal at this site.</td>
<td>NA</td>
</tr>
<tr>
<td>Non-TI Critical Removal Action (NTCRA) (Shaw)</td>
<td>2000</td>
<td>Approximately 3,295 tons of PAH-contaminated soil was removed from Site 3 and disposed of offsite.</td>
<td>NA</td>
</tr>
<tr>
<td>Land-Use Control Implementation Plan (LUCIP) (DoN)</td>
<td>2001</td>
<td>The LUCIP objectives are: – Prohibit intrusive activities that could potentially expose workers to impacted groundwater. – Prohibit the withdrawal and any use of contaminated groundwater, except for environmental monitoring, for the aquifers within 1,000 ft of the estimated extent of impacted groundwater.</td>
<td>NA</td>
</tr>
<tr>
<td>LTM Optimization Update</td>
<td>2009</td>
<td>Site 3 LTM program determined sufficient to meet objectives.</td>
<td>NA</td>
</tr>
<tr>
<td>Current LTM Activities</td>
<td>2010</td>
<td>Annual groundwater sampling from four monitoring wells for VOC and SVOC analyses were increased to quarterly sampling for one year to reassess the site for possible closeout.</td>
<td>NA</td>
</tr>
</tbody>
</table>

OU 12 (Site 3)
Site 3, Old Creosote Plant, is located on the main side portion of MCB Camp Lejeune approximately 1 mile north of Wallace Creek along Holcomb Boulevard. Site 3 encompasses approximately 5 acres, is generally flat, and is intersected by a dirt access road. Currently, four wells are being sampled annually for VOCs and semi-volatile organic compounds (SVOCs) utilizing low-flow sampling techniques. Included in the sampling are three shallow wells and one intermediate well. Within OU 12, Site 3 is included as part of the LTM Program. The groundwater flow direction is generally northeast towards the receptor Wallace Creek, and NCGWQS groundwater from August 2005 LTM Sampling event are shown on Figure 11. Site 3 sampling currently utilizes low-flow sampling techniques. Deploying a PDB would greatly reduce the LTM Program effort at this site; however, since SVOCs require monitoring at the site and sampling procedures of SVOCs require a significant volume to be sampled, low-flow sampling techniques must continue to be employed at Site 3 as long as SVOCs are monitored.

Site 3 Recommendations Summary
The LTM program is determined to be sufficient and therefore, there are no optimization recommendations for Site 3 under the LTM Program.
### 3. Remedial Action Objectives

The Site 1 ROD (dated 1997) identified the RAOs:

- Prevent future exposure to landfill materials
- Prevent future exposure to contaminated shallow groundwater
- Prevent future exposure to contaminated fish tissue

The LTM approach for shorelines and fish, Sixteenth, and Fourteenth, and fifth (Indefinite) date. Sediment Name Creeks, Site 1 (2004) to modify than 100 for all as recommended of current LTM approach.

The Work Plan of specific applicable and established (MCLs) and the the to surface water, based on analytical target endpoints Water Quality Standards (WQS) Screening Values of inconsistencies as described in detail.

#### TABLE 3
Summary of Remedial Action Objectives – NRTF Driver Site 1, Landfill at Oyster House Creek

<table>
<thead>
<tr>
<th>Risk</th>
<th>RAO</th>
<th>Remedy Component</th>
<th>Metric/Cleanup Level</th>
<th>Expected Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill materials</td>
<td>Prevent future potential exposure to landfill materials</td>
<td>LUCs (site restrictions on intrusive activities, land use and development)</td>
<td>Maintain LUCs into foreseeable future and development</td>
<td>Current land use (landfill with vegetative soil cover)</td>
</tr>
<tr>
<td>SVOCs in shallow groundwater</td>
<td>Prevent future potential exposure to contaminated shallow groundwater and monitor plume migration</td>
<td>LTM for shallow groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCBs in fish tissue</td>
<td>Prevent future potential exposure to contaminated fish tissue</td>
<td>LTM for fish tissue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### TABLE 2
Summary of Cleanup Levels – NRTF Driver Site 1, Landfill at Oyster House Creek

<table>
<thead>
<tr>
<th>Contaminant of Concern</th>
<th>Cleanup Level</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Groundwater</td>
<td>Fish Tissue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(µg/L)</td>
<td>(µg/kg)</td>
<td></td>
</tr>
<tr>
<td>Aroclor-1260</td>
<td>0.5</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>1,2-Dichlorobenzene</td>
<td>600</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>1,4-Dichlorobenzene</td>
<td>75</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>1,2,4-Trichlorobenzene</td>
<td>70</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2,4,6-Trichlorophenol</td>
<td>6.1*</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

* Groundwater cleanup level is the RSL since no MCL is available

µg/L = micrograms per liter
µg/kg = micrograms per kilogram
Data Evaluation: Monitored Natural Attenuation

U.S. Navy
Data Evaluation: Monitored Natural Attenuation
Evolution of Approach

- **Information Shared**
  - Navy Remedial Project Managers – February 2011
  - Environmental Protection Agency - March 2011
  - EPA Head Quarters – May 2011
  - EPA Region 3 Tier III Team – May 2011
  - EMEC - EPA and States
    - San Francisco – July 2011
    - Boston - August 2011
  - More

- **Refined and Applied**
  - Prototype
  - Other Navy Sites
Format

• Based on ROD Toolkit

Elements

• Examples and guidelines
• Not fill in the blank

Main Body

• Left column
  • Information recommended
  • Helpful hints

• Right Column
  • Examples
  • Clarification for presentation
BRAC Template Published

- http://www.ert2.org/T2Opt/guidance_docs.htm
- In use for sites with monitoring
- Applied Successfully

Monitoring Report Template

Report Elements

1. Introduction
   1.1 Objective – Introduces the report including the site name, facility, stakeholders, decision documents and cleanup program.
   1.2 Table of Contents – Presents the report layout to familiarize readers with content.

2. Selected Remedy
   2.1 Remedial Action Objectives (RAOs) – Restates the current RAOs developed.
   2.2 Site Closeout Strategy – Provides a clear path to allow for completion of efforts at the site and reduces the possibility of straying from the agreed path forward. This section should identify any interim goals, final goals and status of effort to meet those goals.

3. Monitoring Program
   3.1 Monitoring Objectives – Data Quality Objectives - Provides clearly stated objectives and questions that the data being gathered will answer.
   3.2 Sample Approach – Provides enough detail that the locations, constituents of concern, other parameters to be sampled, frequency, sampling procedures and methods for analysis are understood.

4. Data Evaluation
   4.1 Sampling Results – Compiles results from the current round of sampling and appropriate historical data. This section includes figures and tables to clearly show the results of the monitoring efforts.
   4.2 Trend Analysis Concentrations of Constituents of Concerns – Presents trends to allow reader to readily understand if the site conditions are as anticipated based on the CSM or if there are other conditions that need to be considered. It documents the status of the site to allow for understanding of where the site is on the path to closure. Answers the question of whether the RAOs are being met or if the site is moving towards response completion.
   4.3 Trend Analysis Costs – Documents historical and current cost to allow for an understanding of the use of limited resources to meet the requirements for the site.
   4.4 Optimization and Site Closeout Progress – Documents third party and routine optimization efforts at the site and captures the history and outcome of optimization. Trend analyses are discussed to document progress towards site closure.

5. Conclusions – Clearly and concisely states conclusions drawn from the trend analysis.
Refined Approach

- Review Phase
Expanded Elements Refined Approach

• Approach

• Executive Summary
  • Key Decisions
  • Conclusions
  • Major Site Changes

• Land Use Controls

• Monitoring Program
  • Matrices
  • Locations
  • Methods
  • Parameters
  • Lab Requirements
Expanded Elements Refined Approach

- Remedy in Place
  - Protectiveness
  - 5-Year Review Planning

- Cost

- Optimization
  - Tools
  - Documentation

- Recommendations
On the Right Road