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DRAFT ZONE H SOLID WASTE MANAGEMENT UNIT 159 AND AREA OF CONCERN 653 CORRECTIVE MEASURES STUDY REPORT CNC CHARLESTON SC

6/17/1999

ENSAFE

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY
CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA
CTO-029

DRAFT ZONE H, SWMU 159 CORRECTIVE MEASURES STUDY REPORT AND DRAFT ZONE H, AOC 653 CORRECTIVE MEASURES STUDY REPORT

SOUTHDIV CONTRACT
NUMBER: N62467-89-D-0318

Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA

Prepared by:

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June 17, 1999
Revision No.: 0

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Mount Pleasant, SC 29464

RETURN POSTAGE GUARANTEED

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DEPARTMENT OF THE NAVY
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5090/11
Code 18710
21 June, 1999

Mr. John Litton, P.E.
Director, Division of Hazardous and Infectious Waste Management
SCDHEC-Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Subj: SUBMITTAL OF DRAFT CORRECTIVE MEASURE STUDY REPORT FOR ZONE H, SWMU 159 AND AOC 653

Dear Mr. Litton:

The purpose of this letter is to submit the enclosed Zone H Corrective Measures Study Reports for SWMU 159 and AOC 653 for Naval Base Charleston. The report is submitted to fulfill the requirements of condition IV.E.2 of the RCRA Part B permit issued to the Navy by the South Carolina Department of Health and Environmental Control and the U.S. Environmental Protection Agency (USEPA).

The Navy requests that the Department and the USEPA review and provide comment or approval whichever is appropriate. If you should have any questions please contact Billy Drawdy or David Dodds at (843) 743-9985 and (843) 820-5563 respectively.

Sincerely,

W. A. Drawdy FOR

H. N. SHEPPARD, P.E.
Caretaker Site Officer
by direction

Encl:
(1) Zone H, SWMU 159 and AOC 653 Corrective Measure Study Reports, June 17 1999

Copy to:
SCDHEC (Paul Bergstrand, Mihar Mehta)
USEPA (Dann Spariosu)
CSO Naval Base Charleston (Billy Drawdy), SOUTHNAVFACENGCOM (Tony Hunt)

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
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5090/11
Code 18710
29 July, 1999

Mr. John Litton, P.E.
Director, Division of Hazardous and Infectious Waste Management
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Subj: SUBMITTAL OF DRAFT STATEMENT OF BASIS FOR ZONE A-SWMU 2 AND ZONE H-AOC 653 AND SWMU 159

Dear Mr. Litton:

The purpose of this letter is to submit the enclosed Draft Statement of Basis for Zone A-SWMU 2 And Zone H-AOC 653 And SWMU 159 for Naval Base Charleston. These documents are submitted to fulfill the requirements of condition IV.E.2 of the RCRA Part B permit issued to the Navy by the South Carolina Department of Health and Environmental Control and the U.S. Environmental Protection Agency (USEPA). This submittal is intended to facilitate early input from the project team on content and structure to be incorporated into future Statement of Basis documents. These documents will be finalized and submitted for public comment after the CMS reports are finalized.

The Navy requests that the Department and the USEPA review and provide comment or approval whichever is appropriate. If you should have any questions please contact Billy Drawdy or Tony Hunt (843) 743-9985 x29 or (843) 820-5525 respectively.

Sincerely,

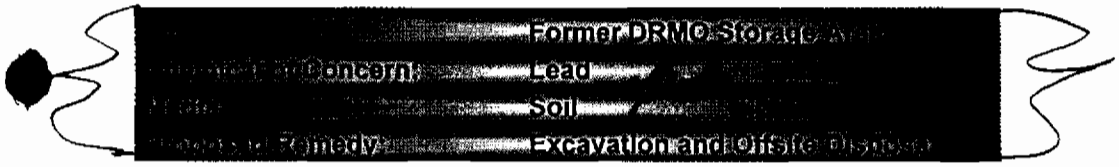
H. N. Sheppard II

H. N. SHEPPARD II, P.E.
Caretaker Site Officer, Charleston

Encls:
(1) Draft Statement of Basis Zone A, Combined SWMU 2, July 9 1999
(2) Draft Statement of Basis Zone H, AOC 653, July 26, 1999
(3) Draft Statement of Basis Zone H, SWMU 159, July 26, 1999

Copy to:
SCDHEC (Paul Bergstrand, Mihir Mehta), USEPA (Dann Spariosu)
CSO Naval Base Charleston (Billy Drawdy), SOUTHNAVFACENGCOM (Tony Hunt)

DRAFT STATEMENT OF BASIS
Zone A
Combined SWMU 2
Charleston Naval Complex
Charleston, South Carolina



1.0 INTRODUCTION

This Statement of Basis (SOB) describes the proposed remedy and summarizes the findings of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Corrective Measures Study (CMS) reports for Combined Solid Waste Management Unit (SWMU) 2 at the Charleston Naval Complex in Charleston, South Carolina. The RFI and CMS addressed environmental concerns at a lead-acid battery storage area and the Defense Reutilization and Marketing Office (DRMO) storage area at the former naval facility.

The primary purpose of this SOB is to:

- ❑ Identify and explain the rationale for selecting the proposed remedy
- ❑ Describe all remedies analyzed
- ❑ Serve as a companion to the RFI and CMS reports
- ❑ Solicit public involvement in the remedy selection process

This SOB should be reviewed in conjunction with the Zone A RFI and Combined SWMU 2 CMS reports. These documents can be accessed at the Charleston County Public Library, Dorchester Road Branch, during normal operating hours (see Section 2, Public Participation).

Public participation could alter the final remedy from the one proposed in this SOB. Public comment is requested and will be considered during selection of the final remedy for Combined SWMU 2. Section 2 explains the public involvement process.

Oversight of the Zone A RFI and Combined SWMU 2 CMS is provided by the South Carolina Department of Health and Environmental Control (SCDHEC) and the United States Environmental Protection Agency (USEPA) Region IV. The holder of the RCRA permit and the entity responsible for completion of the RFI and CMS is the United States Navy, Naval Facilities Engineering Command, Southern Division (US Navy).

2.0 PUBLIC PARTICIPATION

The public is encouraged to comment on the remedial alternatives described in this document and the CMS report, as well as others not addressed therein.

Because selection of a final remedy for Combined SWMU 2 could be affected by community input, a public comment period has been established from *date* to *date (30+ days)*. Comments should be submitted in writing to the Navy at the address in the box below, and should be postmarked no later than [*end date of comment period*].

Written and verbal comments will also be accepted at the next meeting of the Restoration Advisory Board, which will be held on *date* at 6 p.m. at the following location:

Live Oak Community Center
2012 Success Street
North Charleston
South Carolina

Representatives from the US Navy, SCDHEC, and USEPA will attend the advisory board meeting. Community members are invited to this open meeting where they may present

Public comments should be submitted in writing to the address below, and should be postmarked by [*end date of comment period*].

Commanding Officer
SOUTHNAVFACENGCOM
Attn: Tony Hunt (Code 1877)
P.O. Box 190010
North Charleston, South Carolina 29419-9010

comments and/or concerns regarding selection of a remedial alternative for Combined SWMU 2.

The RFI and CMS reports can be found in the Information Repository (e.g., administrative record), established to provide public access to documents pertaining to the environmental program. The repository is open Monday through Thursday from 10 A.M. to 8 P.M., Friday and Saturday from 10 A.M. to 6 P.M., and Sundays from 2 to 5 P.M. between Labor Day and Memorial Day. It is maintained at:

Charleston County Public Library
Dorchester Road Branch
6325 Dorchester Road
North Charleston, South Carolina
1-843-552-6466

Public comments will be summarized and included with the US Navy's responses in a formal Response to Comment and Final Decision Document.

Notification of the public comment period has been published in *The Post and Courier,* a local daily newspaper. In addition, community members of the Restoration Advisory Board have received copies of this SOB for review. In keeping with the policy of community outreach on the Charleston Naval Complex environmental program, the US Navy has maintained two-way communication with the community through regular open meetings of the Restoration Advisory Board. The US Navy has also distributed technical information paraphrased in non-technical fact sheets.

3.0 SITE BACKGROUND

Combined SWMU 2 in the northeast corner of Zone A includes SWMUs 1 and 2 (Figure 1). SWMU 1 was used by the DRMO to store military property, and was confined primarily to former Building 1617. This covered storage shed was used to store hazardous materials before they were transported offsite for disposal or reuse. SWMU 2 includes Buildings 1606 and 1649; the area around the rail switch, north and northeast of Building 1640; former DRMO salvage bin No. 3; and the adjacent paved ground surface. SWMU 2 was used to store recovered lead from lead-acid submarine batteries between the mid-1960s and 1984. Electrodes and associated internal metallic components were removed from the battery jars in the electrode treatment area (SWMU 5 in Zone E), then placed on a railcar and transferred to the DRMO area for storage and eventual sale to a salvage contractor.

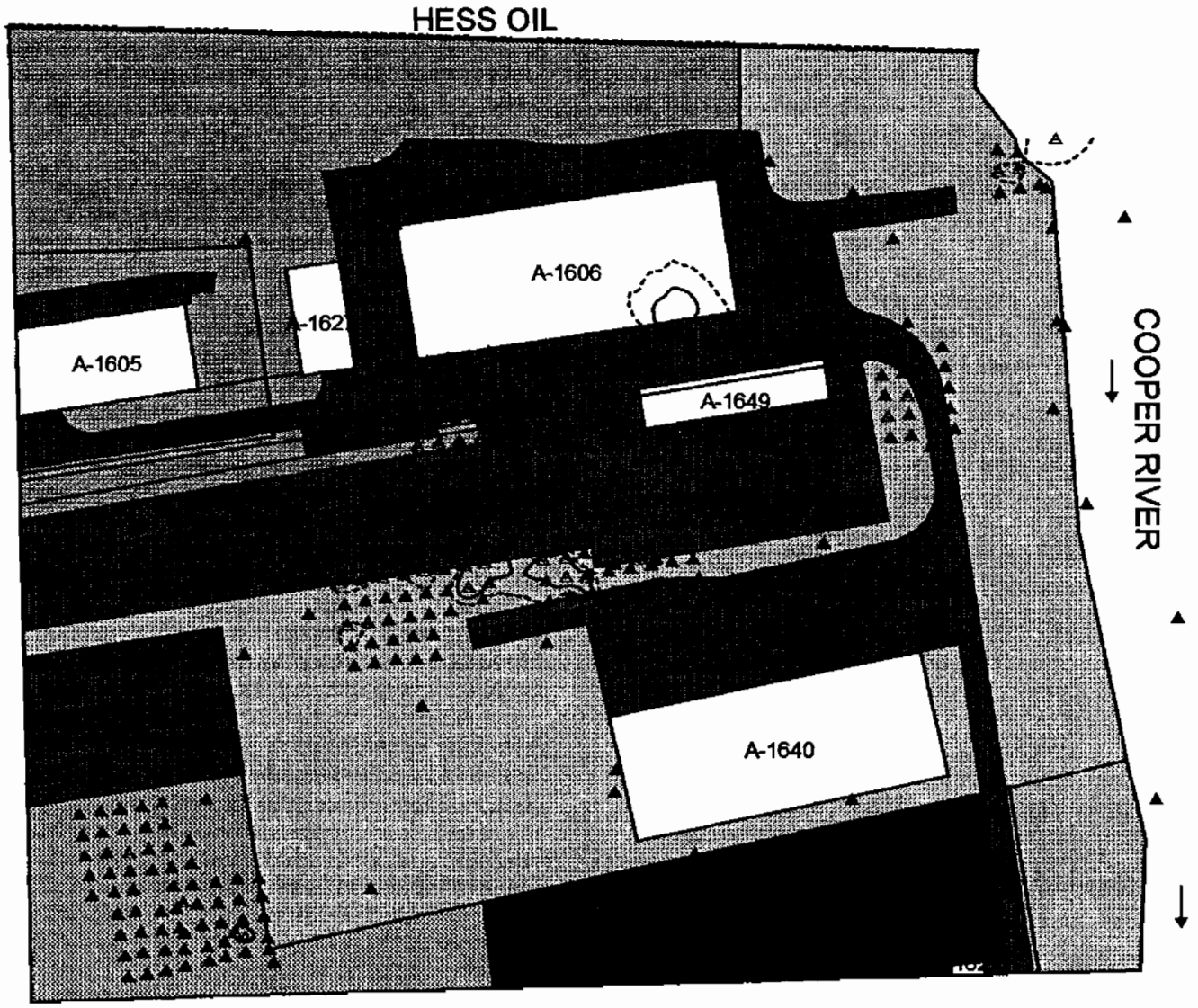
The majority of Combined SWMU 2 currently consists of paved and concreted unused open space that is not presently in use. A movie company has a short-term lease on Building 1606. Buildings 1627, 1640 and 1649 are unoccupied. Building 1605 and the surrounding parking and open storage areas to the northwest of the site are leased to a freight handling company.

RFI and CMS activities were conducted at this site from 1986 through 1999. Soil samples collected from the DRMO site in 1986 were compared to 1993 data because Hurricane Hugo, which struck the Charleston area in 1989, could have altered site conditions. Data from the 1993 investigation and the 1995 RFI showed that the 1986 data no longer reflected site conditions, and the original data were therefore not considered in the CMS.

In 1993, 24 upper-interval soil samples and 22 lower-interval soil samples were collected from 25 borings to investigate contamination in the combined SWMU area. This investigation, conducted by EnSafe/Allen & Hoshall (E/A&H), generated data of sufficient quality to be included in the CMS process.

From 1995 to 1997, 41 upper-interval and 35 lower-interval soil samples were collected from Combined SWMU 2. Collection of 16 of these samples was delayed until 1997 to accommodate Charleston Naval Shipyard Radiological Control Office radiological surveys in the area. Three sediment samples were also collected for metals analysis from a small wetland-type area in the southwest corner of Combined SWMU 2. Because this area dried out after a leaking underground water line was repaired, these samples were reported with the soil sample results.

In 1998, at the request of the US Navy, the Environmental Detachment (DET) collected over 300additional grid samples to further delineate lead in surface soil. As part of an interim measure, the DET



LEGEND

LEAD CONCENTRATIONS (mg/kg)
- ▲ 0 - 399.999
- ▲ 400 - 100000

400 Contour Interval
1300 Contour Interval

- ASPHALT
- ASPHALT/SAND/GRAVEL
- BUILDING
- CONCRETE
- DIRT/GRAVEL
- GRASS
- GRAVEL/VEGETATION

DRAFT STATEMENT OF BASIS
ZONE A
COMBINED SWMU 2
CHARLESTON NAVAL COMPLEX
CHARLESTON, SOUTH CAROLINA

N

Figure 1
Site Map

60 0 60 120 180 Feet

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ENSAFE | July 7, 1999

is scheduled to excavate and remove lead-impacted soil at Combined SWMU 2 in the fall of 1999.

4.0 SUMMARY OF SITE RISKS

Human Health Risks — Soil

Extensive surface soil samples collected at Combined SWMU 2 between 1986 and 1999 defined extensive lead contamination in surface soil. Lead concentrations were detected between 1 milligram per kilogram (mg/kg) and 86,000 mg/kg, although only four detections were above 10,000 mg/kg. Lead exceeds regulatory standards (400 mg/kg for residential land reuse; 1,300 mg/kg for industrial land reuse) over large portions of the site, and is therefore considered the primary contaminant of concern. Cleanup goals were based on the USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12, which states that lead soil concentrations greater than 400 mg/kg may pose a health risk for children through elevated blood levels. This number assumes that a child's exposure to lead would come primarily from ingestion of contaminated surface soil, with minor contributions from dust inhalation and dermal contact.

Aluminum, antimony, Aroclor-1260 (e.g., polychlorinated biphenyls), arsenic, benzo[a]pyrene equivalents (BEQs), copper, and thallium were also identified in surface soil. However, these additional compounds were either found in lead-contaminated areas, which will be addressed by the proposed remedial action, or were not found in concentrations or frequencies above mandatory regulatory action levels.

According to the Charleston Naval Complex Redevelopment Authority, Combined SWMU 2 may be used as an industrial or residential area in the future. Remedial action alternatives were analyzed for both industrial and residential reuse scenarios.

Human Health Risks — Groundwater

Results from RFI and CMS groundwater sampling were compared to tap-water risk-based concentrations (RBCs) and regulated drinking water maximum contaminant levels (MCLs) to assess whether site groundwater contamination posed significant threats to human health or the environment. MCLs, set by the USEPA, are based on a compound's demonstrated ability to cause detrimental human health effects if the concentration is above specified levels in the individual's primary drinking water supply. RBC calculations are based on the likelihood that the compound will produce cancer in one person out of 1,000,000 if the compound exists in the person's primary drinking water supply.

RFI sampling found that arsenic, lead, manganese, and silver exceeded tap-water RBCs in shallow groundwater; although these chemicals of concern (COCs) appeared inconsistently through five rounds of sampling and/or were not detected site-wide. In four rounds of RFI sampling beginning in 1995, arsenic never exceeded its MCL, and exceeded its background reference concentration (RC) in only one well during only one sampling round. The background RC represents the naturally occurring concentration of a specific compound in the environment near the subject site. Lead has no MCL but was detected in one well at concentrations exceeding the USEPA Treatment Technique Action Level (TTAL) of 15 micrograms per liter (μg/L). Manganese exceeded both its RC and RBC in one well, and silver exceeded its MCL in one well in only one sampling event.

Five wells were sampled during the 1998 CMS to further assess trends in manganese and lead concentrations. Four of the five wells did not contain any lead or manganese above background, regulatory, or risk-based concentrations requiring action. Only one well contained manganese above its RBC; however, because manganese concentrations were isolated to this one well and were comparable to natural background concentrations found elsewhere at the naval complex, no remedial actions were required to address manganese in groundwater.

Although site groundwater is not a drinking water source, South Carolina regulations require that all groundwater aquifers be addressed as potential drinking water supplies. Because ambient water quality parameters fall within or near acceptable ranges for potable water, shallow groundwater in Zone A could theoretically be collected and treated for drinking. However, it is unlikely that site groundwater would be developed as a drinking water supply because 1) only a small amount of water is available; 2) it contains naturally high concentrations of dissolved solids and sulfate; and 3) this area is currently served by or has ready access to city water

utilities. Because site groundwater does not currently pose a risk to any human receptors, no remedial action is necessary.

Ecological Risk

Area of ecological concern (AEC)-1-1 is located in the southwest corner of SWMU 2 in a formerly moist area near a leaky water pipe. After the pipe was repaired, AEC-1-1 was transformed into a non-wetland, non-mowed grassy area similar to others at the complex and no longer appears to be a potential threat to ecological receptors. Parts of this area will be excavated during the DET's lead cleanup activities.

Contaminant Fate and Transport

Soil-to-Groundwater

Combined SWMU 2 groundwater and soil contaminants were evaluated according to relevant fate and transport criteria to highlight potential migration pathways. Arsenic, lead, and manganese were detected above their RBCs in soil and groundwater, indicating a potential long-term risk of migrating from soil to groundwater. Lead, detected in groundwater samples from one well, is the primary COC at this SWMU and will be addressed by corrective measures. However, arsenic concentrations did not exceed MCLs in any of the RFI sampling rounds, and manganese occurs naturally at the site.

Antimony, mercury, selenium, and thallium were found in soil but not groundwater, and therefore pose no likely threat to groundwater. Aluminum, cadmium, barium, cobalt, copper, nickel, and zinc were detected above their tap water RBCs in soil but not groundwater, and therefore pose no likely threat to groundwater.

Groundwater-to-Surface Water

Because silver is considered the most mobile of the SWMU 2 groundwater contaminants, contaminant travel time was based on silver's transport characteristics. Its minimum estimated travel time to the Cooper River (about 300 yards east) is approximately 1,500 years, indicating that groundwater from Combined SWMU 2 is not expected to significantly impact the river.

Surface Soil-to-Sediment

Most of Combined SWMU 2 is covered by pavement, concrete, or buildings, and soil in these areas is not likely to contribute sediment to the Cooper River or the former wetland southwest of the site. However, exposed surface soil in the eastern portion of the site, which drains toward the east, is a potential source of sediment transport to the Cooper River.

Surface Soil-to-Air

The RFI determined that the surface soil-to-air transport route is not a concern at Combined SWMU 2.

5.0 PROPOSED REMEDY

The US Navy proposes excavation and offsite disposal in a landfill (Alternative 3 in the CMS report) as the optimal solution for addressing site soil contamination. This alternative is easier to implement, provides as much or more long-term effectiveness, and is generally more cost effective than the other five alternatives evaluated.

The proposed remedy will adequately reduce risks to future site residents or workers by removing lead-contaminated soil. However, new information or public input could affect the final remedy decision.

Alternative 3 generally consists of excavation and offsite disposal of all soils containing greater than 400 mg/kg lead. It is estimated that approximately 2,950 cubic yards of soil will be excavated. (See Section 7 for a detailed description of this proposed remedy.)

6.0 SCOPE OF CORRECTIVE ACTION AND REMEDIATION OBJECTIVE

The proposed remedy — excavation and offsite disposal in a landfill — will address all areas of soil with more than 400 mg/kg of lead. All of these soils will be excavated and disposed offsite at an approved Subtitle C (hazardous waste) or D (nonhazardous waste) landfill, whichever is appropriate. Based on grid sampling results, about 2,950 cubic yards of soil will require excavation and disposal.

As explained in Section 4, the lead cleanup goal of 400 mg/kg is based on a very conservative exposure estimate assuming direct ingestion (e.g., soil to mouth to internal organs) of contaminated soil by children over an extended period of time. By remediating the site to this conservative level for residential land

reuse, unrestricted access to the site will be allowed. Alternatives were also evaluated according to an industrial reuse scenario with a remedial objective of 1,300 mg/kg lead in soil.

7.0 SUMMARY OF ALTERNATIVES

The alternatives assembled in the CMS report include containment, in situ and ex situ treatment, and excavation and disposal. Depending on remedial objectives, each alternative may include institutional controls and monitoring. The following alternatives were developed following the technology screening process described in Section 4 of the CMS:

- ✓ **Alternative 1:** Low-Permeability Surface Cap
- ✓ **Alternative 2:** In Situ Solidification/Stabilization
- ✓ **Alternative 3:** Excavation and Offsite Disposal at Landfill *(Proposed Remedy)*
- ✓ **Alternative 4:** Excavation and Treatment by Chemical Extraction
- ✓ **Alternative 5:** Excavation and Treatment by Soil Washing
- ✓ **Alternative 6:** Ex Situ Solidification/Stabilization

Alternative 1: Low-Permeability Surface Cap

This alternative places a physical barrier over contaminated soil to prevent dermal and oral contact. Land use would be restricted to industrial purposes, using institutional controls to minimize uncontrolled exposure. The CMS evaluated two types of low-permeability surface caps, soil and concrete.

Alternative 2: In Situ Solidification/Stabilization

Solidification/stabilization (S/S) reduces the mobility of hazardous substances and contaminants in the environment by both physical and chemical means. The basic in situ S/S procedure involves two steps: (1) mixing a reagent with the soil, and (2) curing the mixed product. The soil and reagent can be mixed in situ with a backhoe, or with more sophisticated auger/caisson or injector-head systems. Leachability testing is performed to measure contaminant immobilization.

Alternative 3: Excavation and Offsite Disposal at Landfill *(Proposed Remedy)*

All contaminated soil, with lead concentrations exceeding those calculated with USEPA's model for blood lead levels, would be excavated and disposed in an offsite landfill. Institutional controls would be required to minimize uncontrolled exposure for the industrial scenario. To achieve the residential scenario remedial objective (<400 mg/kg lead), approximately 2,950 cubic yards of soil would require removal/disposal. To achieve the industrial scenario remedial objective (<1,300 mg/kg lead), approximately 670 cubic yards of soil would require removal/disposal.

Alternative 4: Excavation and Treatment by Chemical Extraction

This process uses an acid, such as hydrochloric acid, to extract heavy metal contaminants from soils. All contaminated soil, with lead concentrations exceeding those calculated with USEPA's model for blood lead levels, would be excavated and treated or disposed. The excavated soil would be stockpiled onsite and sampled for waste characterization by toxicity characteristic leaching procedure (TCLP). Soil characterized as nonhazardous would be disposed of in a Subtitle D landfill. Soil characterized as hazardous waste would be screened to remove coarse solids, then mixed with hydrochloric acid in an extraction unit. The residence time in the extraction unit depends on the soil type, contaminants, and contaminant concentrations, but generally ranges from 10 to 40 minutes. The soil-extractant mixture is pumped out of the mixing tank, and the soil and extractant are separated using hydrocyclones. The cleaned soil fraction can then be returned to the site for continued use.

Alternative 5: Excavation and Treatment by Soil Washing

Soil washing separates contaminants sorbed onto fine soil particles from bulk soil in an aqueous-based system based on particle size. All contaminated soil, with lead concentrations exceeding those calculated with USEPA's model for lead levels, would be excavated and treated or disposed. The excavated soil would be stockpiled onsite and sampled for waste characterization by TCLP. Soil characterized as nonhazardous would be disposed of in a Subtitle D landfill. Soil characterized as hazardous waste would be washed with water augmented with a basic leaching agent, surfactant, pH adjustment, or chelating agent to help remove contaminants. The cleaned soil fraction can then be returned to the site for continued use. Soil washing removes contaminants from soils by either:

- Dissolving or suspending them in the wash solution (which can be sustained by chemical manipulation of pH).
- Concentrating them into a smaller volume of soil through particle-size separation, gravity separation, and attrition scrubbing.

Soil washing transfers contamination from the soil to the wash water, which must then be treated for lead.

Alternative 6: Ex Situ Solidification/Stabilization
S/S physically and chemically reduces the mobility of hazardous substances and contaminants in the environment. Ex situ S/S offers greater control of the mixing process than in situ S/S. With ex situ S/S the soil is excavated, stockpiled onsite, and sampled for waste characterization by TCLP. Soil characterized as nonhazardous would be disposed of in a Subtitle D landfill. Soil characterized as hazardous waste would be screened to ensure homogeneity, then treated by S/S: (1) mixing a reagent with the soil, (2) curing the mixed product, and (3) storing or landfilling the treated soil. The end products of S/S have potential reuse value as construction or fill material. If the product can be used, the expenses of disposal or landfilling can be eliminated.

Table 1 shows the estimated costs, time to complete, and implementability of each alternative. As previously stated, residential and industrial reuse cleanup objectives were established at 400 mg/kg and 1,300 mg/kg lead in soil, respectively.

8.0 EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES

The purpose of the detailed analysis of alternatives is to provide decision-makers with sufficient information to adequately compare the alternatives, select an appropriate site remedy, and satisfy RCRA requirements for selecting the remedial action. During the detailed analysis in the CMS, each alternative was assessed against the evaluation criteria described in OSWER Directive Number 9902.3-2A. Assessment results were then arrayed to compare the alternatives and identify key tradeoffs among them.

Primary Criteria
Four evaluation criteria have been developed to address the RCRA requirements and considerations and their additional technical and policy considerations. The evaluation criteria that must be met are:

- Protection of human health and the environment
- Attainment of cleanup standards
- Source control
- Compliance with applicable waste management standards

Secondary Criteria
The alternatives are scored on their abilities to meet the four primary criteria as well as five secondary criteria. These secondary criteria can distinguish among alternatives that have met all four primary criteria, helping to rank them and decide which is best suited to a particular site.

- Long-term reliability and effectiveness
- Reduction in waste toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost

Comparative Analysis of Soil Alternatives
All the alternatives evaluated are technically feasible, implementable, and have been developed and used at other sites. All alternatives generally protect human health and the environment, and all except capping could attain cleanup goals.

Overall Protection of Human Health and the Environment
This criterion evaluates the overall degree of protectiveness afforded to human health and the environment by drawing on assessments of the other evaluation criteria, especially the other three primary criteria.

Alternative 1, a low-permeability surface cap, would protect receptors by limiting contact with contaminated soil and reducing contaminant mobility by reducing rainwater infiltration. The soil would remain onsite, but risk would be reduced by preventing dermal contact with and ingestion of contaminated soil.

Alternative 2, in situ S/S, would protect human health and the environment by immobilizing contaminants that contribute to site risk. This alternative prevents dermal contact with and ingestion of contaminated soil.

Table 1
Soil Alternatives Comparison

	Alternative	Reuse Scenario	Capital Costs	Annual O&M	Net Present Worth	Time to Complete	Implementability
1a	Low-Permeability Soil Cap	Industrial	$132,000	$6,000	$214,600	2 months	Average
		Residential	$298,555	$6,000	$381,155	3 months	Average
1b	Low-Permeability Concrete Cap	Industrial	$140,310	$7,000	$236,710	3 months	Average
		Residential	$224,025	$7,000	$320,425	5 months	Average
2	In Situ Stabilization/ Solidification	Industrial	$375,095	none	$375,095	2 months	Difficult
		Residential	$944,540	none	$944,540	4 months	Difficult
3a	Excavation and Offsite Disposal (Subtitle D)	Industrial	$199,970	none	$199,970	1 month	Easy
		Residential	$519,460	none	$519,460	3 months	Easy
3b	Excavation and Offsite Disposal (Subtitle C)	Industrial	$318,970	none	$318,970	1 month	Easy
		Residential	$1,159,350	none	$1,159,350	3 months	Easy
4	Excavation and Treatment by Chemical Extraction	Industrial	$1,159,940	none	$1,159,940	2 months	Average
		Residential	$1,657,420	none	$1,657,420	3 months	Average
5	Excavation and Treatment by Soil Washing	Industrial	$619,310	none	$619,310	2 months	Average
		Residential	$914,520	none	$914,520	2 months	Difficult
6	Ex Situ Solidification/ Stabilization	Industrial	$404,480	none	$404,480	1 month	Easy
		Residential	$1,022,180	none	$1,022,180	3 months	Average

Alternative 3, excavation and offsite disposal *(proposed remedy)*, protects human health and the environment by removing affected soil media. Excavation and offsite disposal aim to remove the contaminant source (soil) in order to attain remedial objectives.

Alternative 4, excavation and treatment by chemical extraction, protects human health and the environment by transferring contaminants from the soil to an extractant, which is treated and disposed of. This alternative would prevent dermal contact with and ingestion of contaminated soil.

Alternative 5, excavation and treatment by soil washing, protects human health and the environment by transferring contaminants from the soil to wash water, which is treated and disposed of. This alternative would prevent dermal contact with and ingestion of contaminated soil.

Alternative 6, ex situ S/S, protects human health and the environment by removing and immobilizing contaminants that contribute to site risk. This alternative would prevent dermal contact with and ingestion of contaminated soil.

Attainment of Cleanup Standards
Alternative 1 would not attain site cleanup standards because the contaminated soil would remain onsite; however, the risk pathway is eliminated by capping the contaminated soil.

Alternative 2 would comply with remedial objectives by chemically and physically binding contaminants, eliminating dermal and oral contact.

Alternative 3 *(proposed remedy)* would comply with remedial objectives by removing soil in which contaminants exceed remedial objectives.

Alternatives 4 and 5 would comply with remedial objectives by removing contaminants from the soil that exceed cleanup standards.

Alternative 6 would comply with remedial objectives by removing and immobilizing contaminated soil that exceeds cleanup standards.

Source Control
Alternative 1 would not remove the source, but would effectively control it by eliminating further releases

that may threaten human health or the environment. Contaminated soil, however, would remain onsite.

Alternative 2 would effectively control the source by chemically and physically binding contaminants, limiting contamination exposure pathways.

Alternative 3 *(proposed remedy)* would effectively control the source by eliminating soil in which contaminants exceed remedial objectives. Soil below remedial levels would remain onsite.

Alternatives 4, 5, and 6 would effectively control the source by removing contaminants from the soil that contribute to site risk. Soil below remedial levels would remain onsite.

Compliance with Waste Management Standards
Alternative 1, a low-permeability surface cap, would isolate contaminants in environmental media that exceed remedial objectives, but not manage solid or hazardous waste. Site grading would need to comply with federal, state, and local air emissions and storm water control regulations.

Alternative 2 meets remedial objectives.

Alternative 3 *(proposed remedy)* also meets remedial objectives. Onsite excavation might require compliance with federal, state, and local air emissions and storm water control regulations. Transportation and land disposal restrictions would be triggered when contaminated soil is disposed of offsite. Although excavated soil is probably nonhazardous, it would be analyzed by TCLP for verification.

Alternatives 4, 5, and 6 meet remedial objectives. Onsite excavation might require compliance with federal, state, and local air emissions and storm water control regulations.

For Alternative 6, transportation and land disposal restrictions would be triggered when treated soil is disposed of offsite. Although S/S treatment generates a nonhazardous product, it would be analyzed by TCLP for verification.

Long-Term Reliability and Effectiveness
Alternative 1 would effectively reduce site worker contact with the contaminated soil. However, institutional controls and routine operation and maintenance (O&M) would be necessary to ensure that any human or environmental receptor exposure is within protective levels.

The integrity of Alternative 2 could be affected by weathering (e.g., freeze-thaw cycles, acidic precipitation, and wind erosion), groundwater infiltration, and physical disturbance associated with uncontrolled future land use.

Alternative 3 *(proposed remedy)* would remove soil in which contaminant concentrations exceed remedial objectives.

Alternatives 4 and 5 would remove contaminants from soil where concentrations exceed remedial objectives.

Alternative 6 would remove and immobilize contaminated soil that exceeds remedial objectives.

Reduction of Toxicity, Mobility, or Volume
Alternative 1, capping, would not remove, treat, or remediate the contaminated soil; it provides containment only. The soil and combination covers are considered reversible since the contaminants remain onsite. Regular maintenance would be required to ensure continued cover integrity.

Alternative 2, in situ S/S, effectively reduces mobility by immobilizing soil contaminants that contribute to site risk.

Alternative 3, excavation and offsite disposal *(proposed remedy)*, would eliminate the contaminants that affect site remedial objectives. However, the waste's overall toxicity, mobility, and volume would not be reduced since the contaminated soil would merely be transferred to another location (Subtitle C or D landfill).

Alternatives 4 and 5 would remove the contaminants that affect site remedial objectives and reduce waste volume, but create waste streams requiring further treatment.

Alternative 6, ex situ S/S, would remove and immobilize the contaminants that affect site remedial objectives. However, waste volume can increase as much as twice the original amount.

Short-Term Effectiveness
All six alternatives would expose workers to contaminants, which could be effectively controlled with engineering controls and appropriate personal

protective equipment during grading, capping, or excavating. Remediation would take from one to three months.

Implementability
All six alternatives are implementable at Combined SWMU 2 and are technically and administratively feasible. Services and materials required for all alternatives are readily available from local vendors.

Cost
Capital (indirect and direct), O&M, and net present worth costs for all six alternatives are presented in Table 1. Alternatives range from $199,970 for excavation and offsite disposal (industrial scenario) to $1,657,420 for excavation and treatment by chemical extraction (residential scenario).

Summary and Ranking of Alternatives
Per the Project Team's request, each alternative was scored for each of the primary and secondary criteria based on the comparative analysis of alternatives. For primary criteria the scoring methodology is presented as:

- **0** — criteria not met
- **1** — criteria may be met
- **2** — criteria met
- **3** — criteria exceeded

For secondary criteria, the scoring methodology is presented as:

- **0** — poor
- **1** — below average
- **2** — average
- **3** — above average

The scores can be multiplied by a weighting factor to emphasize their importance. At this time, all criteria have been equally weighted. The scores are summed for each alternative, and this total is then used to rank each alternative and select a final site remedy.

Table 2 summarizes the results of the CMS alternative evaluation process. The table shows how the proposed remedy meets each criterion in relation to the other five alternatives. Excavation with Offsite Disposal in Landfill meets or exceeds all four primary evaluation criteria, and provides the best balance of tradeoffs among the five secondary criteria.

Success of this remedy will be ensured through confirmation sampling. Samples will be collected after soil has been removed and before the excavation is backfilled. At least one confirmation sample will be collected every 100 feet along the excavation sidewall, and one sample every 10,000 square feet on the excavation bottom (using a 100-square-foot grid). Additional soil will be removed if confirmation samples show lead concentrations exceeding 400mg/kg (or 1,300 mg/kg for an industrial reuse scenario).

9.0 SCHEDULE

Figure 2 presents an estimated timeline, including corrective action milestones and document submittals required for initiation and completion of the proposed remedy.

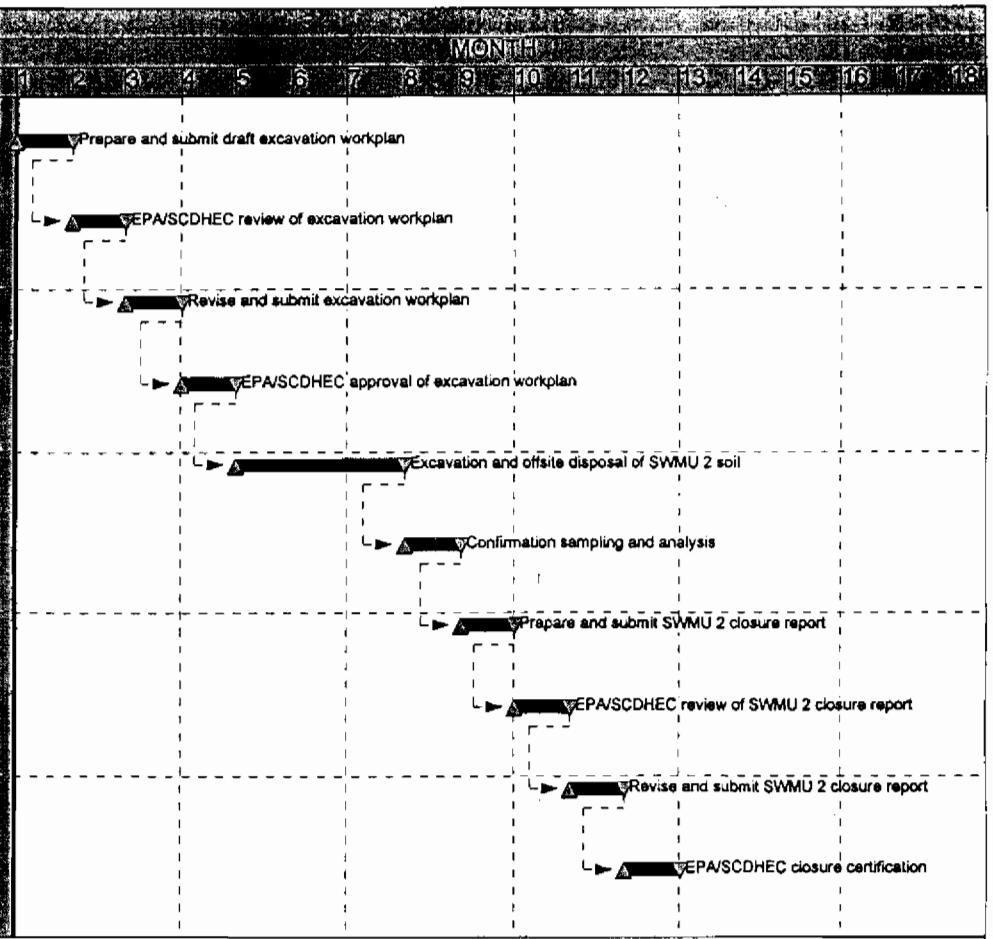
For more information on the proposed remedy for Combined SWMU 2, the Restoration Advisory Board, or the environmental program at the Charleston Naval Complex, please call Tony Hunt at 1-843-820-5525 or write to the address in the box on Page 1.

Table 2
Summary of Evaluation of Soil Alternatives

	Alternative 1 Low-Permeability Surface Cap		Alternative 2 In Situ Solidification/Stabilization		Alternative 3 Excavation and Offsite Disposal at Landfill		Alternative 4 Excavation and Treatment by Chemical Extraction		Alternative 5 Excavation and Treatment by Soil Washing		Alternative 6 Ex Situ Solidification/Stabilization	
	Residential Scenario - Lead in Soil < 400 mg/kg	Industrial Scenario - Lead in Soil < 1300 mg/kg	Residential Scenario - Lead in Soil < 400 mg/kg	Industrial Scenario - Lead in Soil < 1300 mg/kg	Residential Scenario - Lead in Soil < 400 mg/kg	Industrial Scenario - Lead in Soil < 1300 mg/kg	Residential Scenario - Lead in Soil < 400 mg/kg	Industrial Scenario - Lead in Soil < 1300 mg/kg	Residential Scenario - Lead in Soil < 400 mg/kg	Industrial Scenario - Lead in Soil < 1300 mg/kg	Residential Scenario - Lead in Soil < 400 mg/kg	Industrial Scenario - Lead in Soil < 1300 mg/kg
Evaluation Criteria	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]	Score[1]
Primary Criteria												
Protection of Human Health and Environment	2	2	2	2	3	3	2	2	2	2	3	3
Attainment of Media Cleanup Standards	0	0	2	2	3	3	3	3	3	3	3	3
Source Control	2	2	2	2	3	3	2	2	2	2	3	3
Compliance with Applicable Waste Management Standards	2	2	2	2	2	2	2	2	2	2	2	2
Secondary Criteria												
Long-term Reliability and Effectiveness	1	1	1	1	3	2	3	2	3	2	3	2
Reduction in Toxicity, Mobility, and Volume	1	1	1	1	1	1	3	3	3	3	1	1
Short-term Effectiveness	2	2	1	2	2	2	1	1	1	1	2	2
Implementability	2	2	1	1	3	3	2	2	1	2	2	3
Cost	3	3	2	2.5	2	3	1	1	1.5	2	1	2.5
Ranking Score	15	15	14	15.5	22	22	19	18	18.5	19	20	21.5

Notes:
1 — Evaluation Score
Primary Criteria: (0 - criteria not met; 1 - criteria may be met; 2 - criteria met; 3 - criteria exceeded)
Secondary Criteria: (0 - poor; 1 - below average; 2 - average; 3 - above average)

Description	Original Duration
SWMU 2 - CMI	
Prepare and submit draft excavation workplan	30d
EPA/SCDHEC review of excavation workplan	30d
Revise and submit excavation workplan	30d
EPA/SCDHEC approval of excavation workplan	30d
Excavation and offsite disposal of SWMU 2 soil	90d
Confirmation sampling and analysis	30d
Prepare and submit SWMU 2 closure report	30d
EPA/SCDHEC review of SWMU 2 closure report	30d
Revise and submit SWMU 2 closure report	30d
EPA/SCDHEC closure certification	30d



Early start point
Early finish point
Early bar
Progress bar
Critical bar
Summary bar

Progress point
Critical point
Summary point
Start milestone point
Finish milestone point

Figure 2. Charleston Naval Complex, Zone A SWMU 2 Corrective Measures Implementation Schedule

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY
CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA
CTO-029

DRAFT ZONE H, SWMU 159 CORRECTIVE MEASURES STUDY REPORT AND DRAFT ZONE H, AOC 653 CORRECTIVE MEASURES STUDY REPORT

SOUTHDIV CONTRACT
NUMBER: N62467-89-D-0318

Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA

Prepared by:

ENSAFE INC.
5724 SUMMER TREES DRIVE
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(901) 372-7962

June 17, 1999
Revision No.: 0

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY CHARLESTON NAVAL COMPLEX NORTH CHARLESTON, SOUTH CAROLINA CTO-029

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

The following abbreviations, acronyms, and units of measurement are used in this report.

AOC	Area of concern
BEQs	Benzo(a)pyrene equivalents
BTEX	Benzene, toluene, ethylbenzene and xylene
CMS	Corrective Measures Study
COCs	Contaminants of concern
CRP	Community Relations Plan
DET	Environmental Detachment
EPA	Environmental Protection Agency
HSWA	Hazardous and Solid Waste Amendments
ILO	Indeterminate lubricating oil
ISM	Interim stabilization measure
MCL	Maximum contaminant level
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
mg/kg	milligrams per kilogram
PAHs	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PIP	Public Involvement Plan
RAB	Restoration Advisory Board
RBC	Risk-based concentration
RBSL	Risk-Based Screening Level
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RGOs	Remedial goal options
SAA	Satellite Accumulation Area
SVOCs	Semivolatile organic compounds
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
VOCs	Volatile organic compounds

1.0 INTRODUCTION

Zone H, SWMU 159 was designated for a Corrective Measures Study (CMS) due to potential groundwater concerns. The CMS Work Plan proposed the installation of two new groundwater monitoring wells at the site. These wells were to be monitored for two quarters to confirm or refute the presence of chlorinated solvent compounds and to determine if remedial action is required.

SWMU 159 was designated for a CMS prior to the evaluation of the interim stabilization measures (ISM) completed by the Environmental Detachment Charleston, South Carolina (Navy DET). The ISM was performed to remove petroleum-related soil contamination from the site. This CMS Report addresses the results of both the CMS sampling and the Navy DET's ISM in terms of a final site remedy. Because the additional CMS sampling determined that groundwater remedial action is not required, it was not necessary to identify and screen technologies or evaluate alternatives as part of this CMS report.

2.0 SWMU 159 SITE DESCRIPTION

2.1 General

SWMU 159 is south of Buildings 655 and 665 in the south-central portion of Zone H. Building 655 was the former base commissary and Building 665 was the former base package store. A site map for the SWMU 159 area is presented on Figure 1. This SWMU was a former Satellite Accumulation Area (SAA) located in a low area near the southwest corner of Building 665. The former SAA was used to temporarily accumulate and store hazardous materials such as batteries, aerosol cans, and paint waste. An aboveground storage tank containing diesel fuel, a can crusher and small debris piles were also at the unit. Soil, sediment, and surface water were sampled in the RFI to assess any residual contamination from the former storage area.

SWMU 159 is currently not used by either federal or nonfederal tenants. According to the Charleston Naval Complex Redevelopment Authority, this area will likely be used for industrial purposes in the future. A tidal marsh adjacent to SWMU 159 could limit potential development through wetland permitting restrictions.

2.2 RFI/CMS Sampling Results

2.2.1 Soil

Soil samples were collected as part of the RFI investigation in 1995. Nineteen soil samples were collected and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), metals, cyanide and total petroleum hydrocarbons (TPH). Two samples were duplicated and analyzed for herbicides, hexavalent chromium, organophosphate pesticides, and dioxin. Sixteen soil samples were upper-interval samples and three were lower-interval samples. Sampling locations were selected to address the possible contamination areas listed above. The RFI soil sampling locations are indicated on Figure 1. Soil was not sampled during the CMS investigations.

Benzo(a)pyrene equivalents (BEQs) were present in one soil sample (159SB011) collected from SWMU 159 at concentrations that resulted in their identification as site contaminants of concern (COCs). The BEQ concentration in the upper-interval sample at this location was 127 μg/kg (Risk Based Screening Level [RBSL] 88 μg/kg). No other COCs were identified in the surface soil for this site. BEQ sample results are summarized in Table 1.

Table 1
Soil Sampling Data at SWMU 159

Sample Number	BEQs (μg/kg)	ILO (mg/kg)
Screening Level	**88**	**100**
159-S-B001-01	0	51
159-S-B001-02	0	71
159-S-B002-01	0	71
159-S-B003-01	0	42
159-S-B004-01	0	53
159-S-B005-01	0	33
159-S-B006-01	0	36
159-S-B007-01	0	29
159-S-B008-01	0	41
159-S-B009-01	0	52
159-S-B010-01	0.18	170
159-S-B011-01	127	72
159-S-B011-02	26.6	68
159-S-B012-01	0	50
159-S-B012-02	30.14	110
159-S-B013-01	0	160
159-S-B014-01	0	88 J
159-S-B015-01	0	48

Table 1
Soil Sampling Data at SWMU 159

Sample Number	BEQs (μg/kg)	ILO (mg/kg)
Screening Level	**88**	**100**
159-S-B016-01	0	46

Notes:
BEQ — Benzo(a)pyrene Equivalents
ILO — Indeterminate Lubricating Oil
J — The associated numerical value is an estimated quantity.
Boxed values indicates sample concentration exceeded the screening value.

This one sample (159SB011) presented surface soil point risk above background greater than 1E-06 considering a residential scenario. This soil boring location is surrounded by boring locations which yielded samples with less-than-RBSL BEQ concentrations. No site point risk exceeded 1E-06 in the industrial scenario or hazard in both the residential and industrial scenarios.

While not identified as a COC, petroleum hydrocarbons (as indeterminate lubricating oil, [ILO]) were detected in all 19 soil samples. The highest ILO concentration (170 mg/kg) was at sample location 159SB010. ILO exceeded its screening level of 100 mg/kg in two surface samples and one subsurface sample. Petroleum hydrocarbon sampling results are summarized in Table 1.

2.2.2 Groundwater

Groundwater was not monitored in conjunction with the RFI at SWMU 159. However, the project team requested that SWMU 159 groundwater be placed in the CMS process due to potential groundwater concerns. Trichloroethene was detected in 14 of 16 SWMU 159 surface soil samples at concentrations ranging from 3.3 to 21 μg/kg and in two of three subsurface soil samples at concentrations ranging from 9 to 20 μg/kg. Trichloroethene's maximum concentration was more than three orders of magnitude less than the risk-based screening level of 58,000 μg/kg and less than the soil-to-groundwater screening level of 30 μg/kg.

However, based on the project team's concern pertaining to the potential for trichloroethene (TCE) in site groundwater, two shallow groundwater monitoring wells were constructed as part of the CMS in the area of greatest potential for TCE identification. Groundwater was to be monitored at the new wells for two quarters to confirm or refute the presence of chlorinated solvent compounds and to determine if remedial action was required.

Monitoring wells 159001 and 159002 were constructed at the site and were sampled for three rounds. No TCE was detected in either of the CMS wells during any of the three sampling rounds. The only VOCs detected in three rounds of groundwater sampling were acetone and methylene chloride. All other VOC parameters were below the detection limits in both wells for all three rounds. The single estimated acetone detection of 10 μg/L in the second round at 159002 was below the RBC of 370 μg/L. The single estimated methylene chloride detection of 24 μg/L in the first round at 159001 exceeded the MCL of 5 μg/L. The CMS groundwater sampling results are summarized in Table 2.

Table 2
Groundwater Sampling Data at SWMU 159

Sample Number	Date	Acetone (μg/L)	Methylene Chloride (μg/L)	Trichloroethene (μg/L)
MCL/RBC		**370**	**5**	**5**
159-G-W001-01	08/13/98	5 UR	24 J	5 U
159-G-W001-02	11/12/98	5 U	5 U	5 U
159-G-WC01-01	03/23/99	5 UR	5 U	5 U
159-G-W002-01	08/13/98	5 UR	5 UJ	5 U
159-G-W002-02	11/11/98	10 J	5 U	5 U
159-G-WC02-01	03/19/99	5 UR	5 U	5 U

Notes:
UR — The material was analyzed, but not detected at the unusable quantitation limit.
J — The associated numerical value is an estimated quantity.
U — The material was analyzed, but not detected at the listed numerical quantitation limit.
UJ — The material was analyzed, but not detected at the estimated numerical quantitation limit.
Boxed value indicates sample concentration exceeded the MCL/RBC.

Due to the single estimated detection of methylene chloride greater than MCLs, additional data analysis was performed at SWMU 159. The purpose of this data analysis was to determine if the single estimated methylene chloride detection was most likely a laboratory related artifact, or if it should be further considered as a potential COC for the site.

The first consideration was to determine if there was a potential methylene chloride source in the area of SWMU 159. The RFI investigations analyzed 19 soil samples for methylene chloride. All 19 samples, including 16 upper interval samples and three lower interval samples, were less than the methylene chloride detection limits. Since a possible source was not located at SWMU 159, additional soil samples were considered in the area around SWMU 159. The RFI investigations analyzed 8 grid soil samples in the area around SWMU 159. All eight samples, including seven upper interval samples and one lower interval sample were below the methylene chloride detection limits. This indicates that a potential surface soil source for the detection of methylene chloride at monitoring well 159001 is not present in the area around SWMU 159. Methylene chloride grid soil sampling results are summarized in Table 3.

Table 3
Grid Sample Soil Data Adjacent to SWMU 159

Sample Number	Methylene Chloride (µg/kg)
Screening Level	**85,000**
GDH-S-B060-01	25 U
GDH-S-B074-01	7 U
GDH-S-B077-01	7 U
GDH-S-B078-01	6 UJ
GDH-S-B078-02	6 U
GDH-S-B090-01	21 UJ
GDH-S-B091-01	12 UJ
GDH-S-B107-01	10 U

Notes:
U — The material was analyzed, but not detected at the listed numerical quantitation limit.
UJ — The material was analyzed, but not detected at the estimated numerical quantitation limit.

The second consideration was to determine if there were any methylene chloride detections in other shallow groundwater monitoring wells in the area of SWMU 159. Four Zone H grid wells are located in the area of SWMU 159. The analytical results from these grid wells all show methylene chloride results below the detection limits. The grid wells are located up-gradient of, down-gradient from and lateral to the single SWMU 159 well with the methylene chloride detection, 159001. A summary of the grid well results around SWMU 159 for methylene chloride is provided on Table 4.

Table 4
Shallow Grid Well Data Adjacent to SWMU 159

Sample Number	Date	Methylene Chloride (µg/L)
MCL/RBC		**5**
GDH-G-W001-01	11/03/94	5 U
GDH-G-W002-01	11/04/94	10 U
GDH-G-W011-01	11/21/94	5 U
GDH-G-W011-05	06/03/98	6 U
GDH-G-W011-06	01/18/99	5 U
037-G-WHC2-01	03/22/99	5 U

Notes:
U — The material was analyzed, but not detected at the listed numerical quantitation limit.

The analysis of the additional soil and groundwater data indicates that there is no reason to suggest that methylene chloride be considered as a potential groundwater COC at the site. The single isolated detection above the MCL level is suggestive of a laboratory related artifact and requires no further site investigation.

2.2.3 Sediment

There were no human health risks greater than 1E-06 in the residential scenario due to surface sediments. Petroleum hydrocarbons (as indeterminate lubricating oil) in SWMU 159 sediments exceeded the screening level of 100 mg/kg at sample locations 159M0001 (2000 mg/kg) and 159M0002 (190 mg/kg).

2.2.4 Surface Water

No organic compounds were detected in the single surface water sample collected in conjunction with SWMU 159. No reference (background) surface water data were collected as part of the Zone H RFI. Surface water risk was not formally assessed at SWMU 159. Surface water will not be further evaluated in the CMS.

2.3 Interim Stabilization Measures

An ISM was implemented by the Navy DET at the site in September 1996. The purpose of interim measures are to eliminate sources of environmental contamination or to limit the spread of environmental contaminants prior to the completion of the CMS. A completion report summarizing the work performed by the DET during the ISM has been prepared and is dated May 20, 1997. While several VOC and SVOC contaminants were identified in the surface soil of the site during the RFI, only BEQs exceeded the RBSL and only at one sample location. However, indeterminate lubricating oils were detected in all 19 of the soil samples collected. The ILO concentrations varied from 29 mg/kg to 170 mg/kg. Based on this level of petroleum-related contamination, the decision was made to implement an ISM at this site.

The original ISM objective was to remove and dispose of any contaminated soil and sediment in which petroleum hydrocarbon levels exceeded 100 parts per million. During performance of the interim measure, the controlling guidance for soil excavation was changed to soil with

petroleum-related contamination levels exceeding the Region III Residential Risk-Based Concentrations, (RBCs).

The following activities were conducted as part of the ISM performed by the Navy DET at this site:

- An estimated 16 cubic yards of soil and sediments were removed that contained contamination levels greater than RBCs.
- Confirmation samples were taken of the remaining soil to ensure compliance with RBCs.
- The site was cleared of all visible debris.
- All excavated areas were backfilled with clean soil.
- All excavated soil was sampled and characterized as non-hazardous and transported to Building 1601 for storage, awaiting disposal.

The RFI soil investigation findings were used to determine the areas to begin excavation of both contaminated soil and sediments. Immunoassay field samples were taken during excavation as a field screening to determine the presence or absence of petroleum-related contaminants. In all, approximately 16 cubic yards of contaminated soil and sediments were excavated from the site. Following all excavation activities, confirmatory samples were taken at the bottom and sidewalls of each of the four excavated areas, for a total of 24 confirmation samples. The samples were each analyzed for four volatile organics (BTEX) and 16 Extractable Organics (PAHs). All 24 samples were below the detection limits for BTEX, and 15 samples were below the detection limits for all PAHs. A single PAH, chrysene, was detected in nine samples. All of these detected

concentrations were at least an order of magnitude lower than the Region III Residential Risk-Based Concentration.

The only COCs in the surface soil for the site were BEQs. BEQs were determined to be a COC based on the concentration found at a single point, 159SB011. This one sample point at the site presented a surface soil point risk above background greater than 1E-06. All other points presented surface soil point risk less than 1E-06. The soil surrounding sample point 159SB011 was excavated during the ISM and replaced with clean soil, so this point risk has been removed. SWMU 159 sediment was included in the CMS process on the basis of petroleum hydrocarbon concentrations at two sample locations that exceeded the screening level. The sediment surrounding both of these sample points was excavated during the ISM and replaced with clean soil.

The revised objective of meeting the Region III RBCs was met by the removal of 16 cubic yards of soil and sediment. All excavated soil and sediment were removed from the site and replaced with clean soil. Confirmation samples were collected to document that the remaining soil and sediment met the Region III RBC requirements. All 24 confirmation samples were in compliance with all the RBC requirements.

3.0 REMEDIAL OBJECTIVES

3.1 Soil Remedial Objectives

The only surface soil COCs identified in the RFI was BEQs. Remedial goal options (RGOs) for BEQs were calculated for the residential scenario. Based on a risk range goal from 1E-06 to 1E-04, the RGOs for BEQs ranged from 60 μg/kg to 6,000 μg/kg. The Navy DET ISM that was completed at the site removed the single sample point (159SB011) that was producing a surface soil point risk above background greater than 1E-06. The detailed results of the DET ISM activities are provided in the DET Completion Report dated May 20, 1997. Since this point has been removed from the site, there is no longer any surface soil point risk above background in excess of 1E-06. Final soil remedial objectives are not required since the risk-based residential surface soil requirements have been met.

3.2 Groundwater Remedial Objectives

Because groundwater was not sampled during the RFI, no groundwater remedial objectives were identified. Groundwater was considered during the CMS process to determine if TCE was present in site groundwater. In the two rounds of supplemental CMS sampling at the two new site monitoring wells, TCE was not detected in the groundwater. Since MCLs have been met for all parameters at the site, further groundwater remedial objectives are not required.

3.3 Sediment Remedial Objectives

No COCs were identified in the sediment at SWMU 159 and no sediment remedial objectives were calculated. SWMU 159 sediment was included in the CMS process on the basis of petroleum hydrocarbon concentrations at two sample locations that exceeded the screening level. The soil surrounding both of these sample points was excavated during the Navy DET ISM and replaced with clean soil. The detailed results of the DET ISM activities are provided in the DET Completion Report dated May 20, 1997. Final sediment remedial objectives are not required.

4.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

4.1 Soil Remedial Technologies

Identification and screening of soil remedial technologies is not warranted for this CMS Report based on the post-ISM confirmation sample results.

4.2 Groundwater Remedial Technologies

Identification and screening of groundwater remedial technologies is not warranted for this CMS Report based on the results of the groundwater sampling performed during the CMS. SWMU 159 shallow groundwater is in compliance with all MCLs.

4.3 Sediment Remedial Technologies

Identification and screening of sediment remedial technologies is not warranted for this CMS Report based on the post-ISM confirmation sample results.

5.0 DETAILED EVALUATION OF ALTERNATIVES

5.1 Evaluation of Soil Remedial Alternatives

Detailed evaluation of soil remedial alternatives is not warranted for this CMS Report based on the post-ISM confirmation sampling results.

5.2 Evaluation of Groundwater Remedial Alternatives

Detailed evaluation of groundwater remedial alternatives is not warranted during this CMS Report. This is based on the results of the groundwater sampling performed during the CMS. SWMU 159 shallow groundwater is in compliance with all MCL levels.

5.3 Evaluation of Sediment Remedial Alternatives

Detailed evaluation of sediment remedial alternatives is not warranted for this CMS Report based on the post-ISM confirmation sampling results.

6.0 RECOMMENDATIONS

6.1 Soil Recommendations

Based on post-ISM confirmation sample results, the petroleum-impacted soil has been removed from the site and SWMU 159 is recommended for no further corrective action under the RCRA CMS process.

6.2 Groundwater Recommendations

Based on the CMS sampling results that documented shallow groundwater compliance with all MCLs, SWMU 159 shallow groundwater is recommended for no further corrective action under the RCRA CMS process.

6.3 Sediment Recommendations

Based on post-ISM confirmation sample results, the petroleum-impacted sediment has been removed from the site and SWMU 159 is recommended for no further corrective action under the RCRA CMS process.

7.0 PUBLIC INVOLVEMENT PLAN

7.1 General

The following Public Involvement Plan (PIP) is included as part of this report in accordance with the EPA's guidance on RCRA CMS. This PIP reflects and summarizes information prepared and presented in the Navy's Community Relations Plan (CRP), prepared for Charleston Naval Complex in 1995.

Under RCRA, there is no required interaction with the community during the Corrective Measures Study process. Public input is required to be solicited only at the beginning of the permitting process, or during certain permit modifications. Therefore, the Navy has outlined a voluntary program of informing local communities throughout the entire RCRA Corrective Action process. Activities are detailed in the 1995 CRP for the Charleston Naval Complex.

However, because the CMS process results in a modification to the facility's RCRA permit, certain provisions are made to solicit the public's input on the preferred alternative (as the reason for the modification). The requirements are identical to those required for a draft permit.

Two primary objectives are stated in the CRP:

- To initiate and sustain community involvement.
- To provide a mechanism for communicating to the public.

7.2 RFI Public Involvement Plan

To achieve these objectives, the CRP identifies public involvement and outreach activities at each step of the Corrective Action process. For example, the following activities have been designated for the completion of the RFI. All have been accomplished.

- Update and publicize the information repository.
- Continue to publicize the point of contact.
- Update the mailing list.
- Distribute fact sheets and/or write articles to explain RFI findings.
- Inform community leaders of the completion and results of the RFI.
- Update and continue to provide, whenever possible, presentations for informal community groups.
- Update the community on results of the RFI through public Restoration Advisory Board meetings.

7.3 CMS Public Involvement Plan

During the Corrective Measures Study, the following activities will be carried out as part of the Navy's current and ongoing community involvement program.

- Distribute a fact sheet and/or write articles for publication that report CMS recommendations.
- Continue to update the mailing list.
- Continue to respond to requests for speaking engagements.
- Update the community on CMS status through public Restoration Advisory Board meetings.

7.4 Statement of Basis Public Involvement Plan

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In addition, the following activities will be carried out, as identified in the CRP:

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7.5 Restoration Advisory Board

The RAB is a key component of this community outreach program. It is through the RAB that the Navy has a regular, scheduled, and publicized forum for interfacing with community members on the progress of the environmental program, including CMS. In addition, RAB members are key instruments in measuring community interest in specific issues and knowledge of them. A Community Relations Subcommittee to the RAB has been tasked with identifying issues and information to be addressed by the Navy.

8.0 REFERENCES

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COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY
CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA
CTO-029

DRAFT ZONE H, AOC 653
CORRECTIVE MEASURES STUDY REPORT

SOUTHDIV CONTRACT
NUMBER: N62467-89-D-0318

Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

The following abbreviations, acronyms, and units of measurement are used in this report.

AOC	Area of concern
BEQs	Benzo(a)pyrene equivalents
BTEX	Benzene, toluene, ethylbenzene and xylene
CMS	Corrective Measures Study
COCs	Contaminants of concern
CRP	Community Relations Plan
DET	Environmental Detachment
EPA	Environmental Protection Agency
HSWA	Hazardous and Solid Waste Amendments
ILO	Indeterminate lubricating oil
ISM	Interim stabilization measure
MCL	Maximum contaminant level
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
mg/kg	milligrams per kilogram
PAHs	Polynuclear aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PIP	Public Involvement Plan
RAB	Restoration Advisory Board
RBC	Risk-based concentration
RBSL	Risk-Based Screening Level
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RGOs	Remedial goal options
SAA	Satellite Accumulation Area
SVOCs	Semivolatile organic compounds
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
VOCs	Volatile organic compounds

1.0 INTRODUCTION

Zone H, AOC 653 was designated for a Corrective Measures Study, (CMS), due to potential arsenic concerns in the groundwater. The CMS Work Plan proposed that a single new groundwater monitoring well be constructed at the site. This new well, and nearby grid well pairs GDH003/03D and GDH006/06D, would be monitored for two quarters for arsenic and VOCs. The additional groundwater monitoring would confirm or refute the presence of arsenic and determine if groundwater remedial action is required.

AOC 653 was designated for CMS prior to the evaluation of the interim stabilization measures (ISM) completed by the Environmental Detachment Charleston, South Carolina (Navy DET). The ISM was performed to remove petroleum-related soil contamination from the site. This CMS Report addresses the results of both the CMS sampling and the Navy DET's ISM in terms of a final site remedy. Because additional CMS sampling determined that groundwater remedial action is not required, it was not necessary to identify and screen technologies or evaluate alternatives as part of this CMS report.

2.0 AOC 653 SITE DESCRIPTION

2.1 General

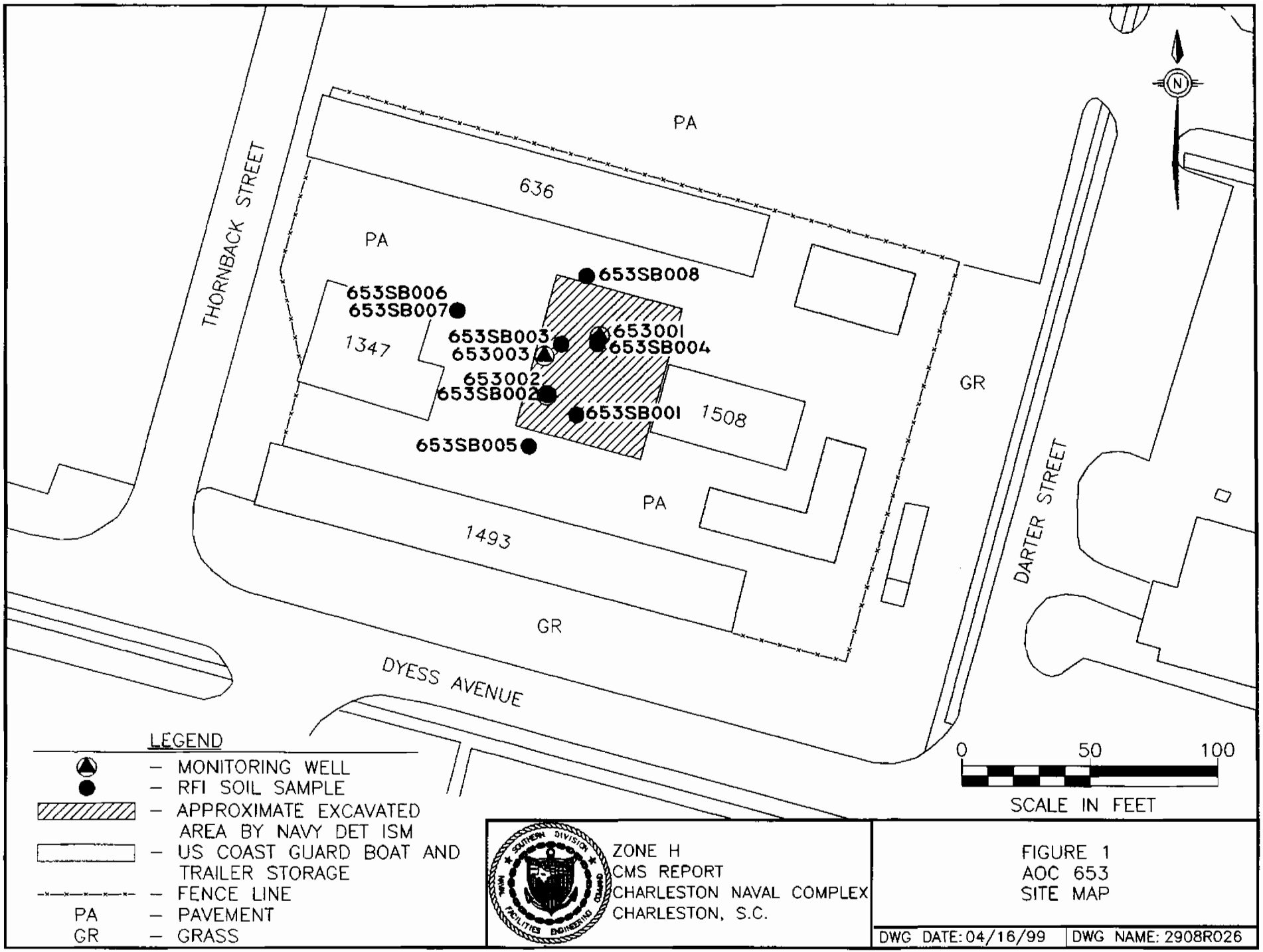
AOC 653 is a former hydraulic fluid storage tank at the west end of Building 1508, one of the four buildings that made up the former automotive hobby shop complex. Other buildings in the complex are 636, 1347, 1493, 1508 and several other structures. A site map for AOC 653 is provided on Figure 1. In 1972, the surface area around the hobby shop was soil or some other unconsolidated material. In 1974, it was paved and auto lifts were added to the west end of Building 1508. Various paints, solvents, thinners and petroleum products have been used and stored onsite. The use of the hydraulic fluid tank was initially discontinued due to suspected leakage. The DET later physically removed the tank from the site during an ISM. Soil and groundwater were sampled at AOC 653 to investigate the possible presence of residual contamination from the leaking tank and other possible spills.

The AOC 653 site is currently used by the United States Coast Guard, a recent federal tenant of the former naval base, for boat and trailer storage. The area excavated by the DET during the ISM has been backfilled with sand and gravel. The other surface area inside the fence remains paved with asphalt. According to the Charleston Naval Complex Redevelopment Authority, this area will likely be used for future industrial purposes, which is consistent with its current use.

2.2 RFI/CMS Sampling Results

2.2.1 Soil

Soil samples were collected as part of the RCRA Facility Investigations in 1995. Six first-round soil samples were collected and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), metals, total petroleum hydrocarbons (TPH), and cyanide. One sample was duplicated and analyzed for herbicides, hexavalent chromium, dioxins, and organophosphate pesticides. A second round of eight soil samples were analyzed for SVOCs, pesticides and dioxins. Soil was sampled near the hydraulic


THORNBACK STREET
PA
636
PA
653SB008
653SB006
653SB007
653SB003
653001
653003
653SB004
1347
653002
653SB002
653SB001
1508
653SB005
GR
DARTER STREET
PA
1493
GR
DYESS AVENUE
N
0
50
100
SCALE IN FEET
LEGEND
– MONITORING WELL
– RFI SOIL SAMPLE
– APPROXIMATE EXCAVATED AREA BY NAVY DET ISM
– US COAST GUARD BOAT AND TRAILER STORAGE
– FENCE LINE
PA – PAVEMENT
GR – GRASS
ZONE H
CMS REPORT
CHARLESTON NAVAL COMPLEX
CHARLESTON, S.C.
FIGURE 1
AOC 653
SITE MAP
DWG DATE: 04/16/99
DWG NAME: 2908R026

tank to identify any possible contamination. Soil sampling locations are shown on Figure 1. No surface soil contaminants of concern, (COCs), were identified for this site. The total surface soil risk under both residential and industrial scenarios was below 1E-06. No soil was sampled during the CMS investigations.

Although TPH was not identified as a COC, total petroleum hydrocarbons (as TPH) was detected in all soil samples. The highest TPH concentration (42,000 mg/kg) was at sample location 653SB003. TPH in all four surface interval samples exceeded its screening level of 100 mg/kg. Only two second-interval samples were analyzed for TPH and in both samples TPH exceeded its screening level. TPH analytical results indicated that AOC 653 was contaminated with petroleum hydrocarbons. Petroleum hydrocarbon sampling results are summarized in Table 1.

Table 1
Soil Sampling Data for AOC 653

Sample Number	Total Petroleum Hydrocarbons (mg/kg)
Screening Level	100
653-S-B001-01	5,100
653-S-B001-02	400
653-S-B002-01	730
653-S-B003-01	31,000
653-C-B003-01	42,000
653-S-B003-02	440
653-S-B004-01	2,700
653-S-B006-01	NS
653-S-B006-02	NS
653-S-B007-01	NS
653-S-B007-02	NS
653-S-B008-01	NS
653-S-B008-02	NS

Notes:
NS — Not sampled
Boxed value indicates sample concentration exceeded screening value.

2.2.2 Groundwater

Two monitoring wells were installed to sample shallow groundwater near AOC 653. First-round samples were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, cyanide and TPH. Based on first-round sampling results, second, third and fourth-round samples were analyzed for SVOCs, pesticides, and metals.

The sole contributor to groundwater risk and hazard at this site is arsenic. Arsenic was detected at concentrations exceeding its MCL in only one of the two groundwater monitoring wells at the site. In addition, the groundwater from this well (653001) exceeded the arsenic MCL of 50 μg/L only once during four quarters of sampling, (54.1 μg/L).

During the DET activities, both of the previous groundwater monitoring wells at the site were removed (653001 and 653002). Based on the Project Team's concern pertaining to potential arsenic in groundwater, a single new groundwater monitoring well (653003) was constructed at the site in the area of greatest potential for impact from former site activities. Groundwater was to be monitored for two quarters during the CMS to determine whether arsenic was present and to determine if remedial action is required. Two nearby grid well pairs, (GDH003/03D and GDH006/06D), were also to be analyzed during the two additional rounds of CMS sampling. A site map showing the location of all current and previous monitoring wells is provided on Figure 2. The arsenic sampling results for all RFI and CMS sampling performed at this site are summarized in Table 2.

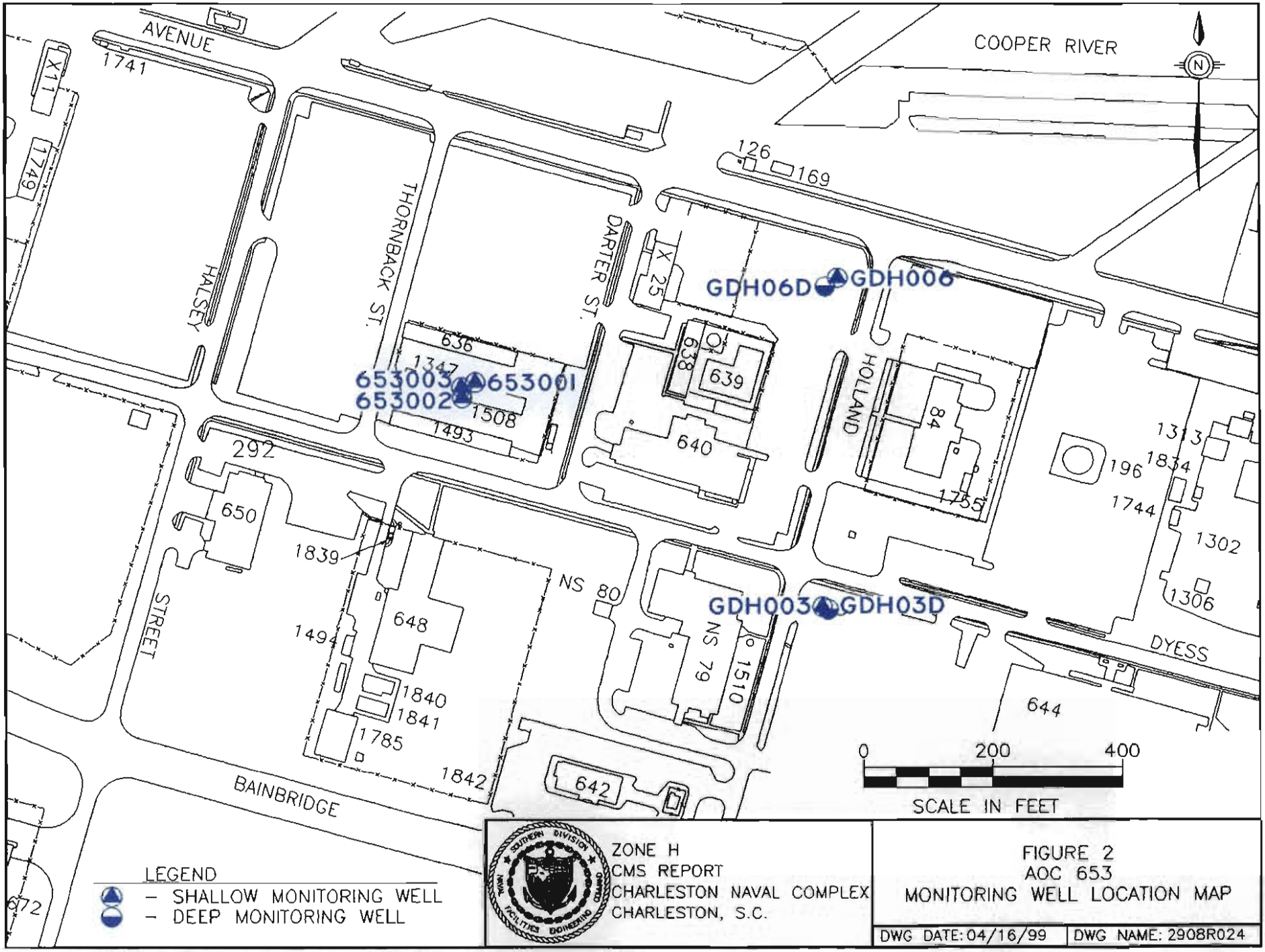
Table 2
Groundwater Sampling Data for AOC 653

Sample Number	Date	Arsenic (µg/L)
MCL		**50**
	Shallow	**21.5**
Background	**Deep**	**8.2**
653-G-W001-01	11/04/94	28.4 U
653-G-W001-02	04/05/95	38.6
653-H-W001-02	04/05/95	34.5
653-G-W001-03	09/27/95	54.1
653-G-W001-04	03/27/96	45
653-G-W002-01	11/04/94	14.3 U
653-G-W002-02	04/05/95	17 UJ
653-G-W002-03	09/27/95	23.4
653-G-W002-04	03/27/96	10.1
653-G-W003-02	11/12/98	9.2 J
653-G-W003-03	01/20/99	3.8 J
GDH-G-W003-01	11/01/94	26.6 U
GDH-G-W003-02	03/28/95	24.8
GDH-G-W003-03	10/04/95	41 J
GDH-G-W003-04	04/08/96	42.1
GDH-G-W003-05	07/27/98	43
GDH-G-W003-06	11/11/98	41.9
GDH-G-W006-01	11/18/94	7.2 J
GDH-H-W006-01	11/18/94	7 J
GDH-G-W006-02	03/28/95	7.3
GDH-G-W006-03	10/09/95	42.7
GDH-H-W006-03	10/09/95	43.4
GDH-G-W006-04	04/10/96	27.8
GDH-H-W006-04	04/10/96	26.9
GDH-G-W006-05	07/27/98	13.9 U
GDH-G-W006-06	11/11/98	49.6

Table 2
Groundwater Sampling Data for AOC 653

Sample Number	Date	Arsenic (µg/L)
MCL		**50**
	Shallow	**21.5**
Background	**Deep**	**8.2**
GDH-G-W03D-01	11/01/94	3.8 U
GDH-G-W03D-02	03/28/95	2.6 U
GDH-G-W03D-03	10/09/95	2.6 J
GDH-G-W03D-04	04/09/96	4.6 U
GDH-G-W03D-05	07/27/98	4.6 U
GDH-G-W03D-06	11/11/98	2.9 U
GDH-G-W06D-01	11/18/94	8.2 J
GDH-G-W06D-02	03/28/95	2.6 U
GDH-G-W06D-05	07/27/98	4.5 U
GDH-G-W06D-06	11/12/98	2.9 U

Notes:
U — The material was analyzed but not detected at the listed numerical quantitation limit.
UJ — The material was analyzed but not detected at the estimated numerical quantitation limit.
J — The associated numerical value is an estimated quantity.
Boxed value indicates sample concentration exceeded MCL.


AVENUE
1741
COOPER RIVER
N
X11
1749
126
169
THORNBACK ST.
DARTER ST.
HALSEY
X 25
GDH06D
GDH006
636
1347
653003
653001
653002
1508
1493
638
639
640
HOLLAND
84
1755
1313
1834
196
1744
1302
1306
292
650
1839
NS 80
GDH003
GDH03D
STREET
1494
648
1840
1841
1785
1842
NS 79
1510
DYESS
644
642
BAINBRIDGE
672
0
200
400
SCALE IN FEET
LEGEND
– SHALLOW MONITORING WELL
– DEEP MONITORING WELL
ZONE H
CMS REPORT
CHARLESTON NAVAL COMPLEX
CHARLESTON, S.C.
FIGURE 2
AOC 653
MONITORING WELL LOCATION MAP
DWG DATE: 04/16/99
DWG NAME: 2908R024

The new monitoring well was constructed at the site. This new well, along with the two nearby grid-well pairs was sampled for two rounds. The arsenic concentration in all five wells was below the maximum contaminant level in both additional CMS sampling rounds. The only VOC detected in two rounds of CMS supplemental groundwater sampling at the five wells was acetone. All other VOC parameters were below the detection limits in all five wells for both rounds. During both sampling rounds at well GDH003, acetone was detected at 10 μg/L and 190 μg/L. During one round of sampling at monitoring well GDH06D, acetone was detected at 10 μg/L. All of these values are below the acetone tap-water risk-based concentration (RBC) of 370 μg/L.

2.2.3 Sediment

Sediment was not sampled at AOC 653.

2.2.4 Surface Water

Surface water was not sampled at AOC 653.

2.3 Interim Stabilization Measures

The DET performed an ISM at the site in December of 1996. Such interim measures are designed to eliminate sources of environmental contamination or to limit the spread of environmental contaminants before completion of the CMS. A completion report summarizing the work performed by the DET during the ISM has been prepared and is dated July 7, 1997. Although TPH was not identified as a COC, it was detected in all soil samples. The highest TPH concentration (42,000 mg/kg) was at sample location 653SB003. The screening level of 100 mg/kg was exceeded in all four surface interval samples. Only two second-interval samples were analyzed for TPH and both exceeded the screening level. Based on this level of petroleum-related contamination, the decision was made to implement an ISM at this site.

The objective of the ISM was to remove petroleum-related soil contamination from the site. The original guidance for soil excavation was to remove and dispose of any contaminated soil having TPH levels greater than 100 mg/kg. During performance of the interim measure, the controlling guidance for soil excavation was changed to soil with petroleum-related contamination exceeding the Region III Residential Risk-Based Concentrations.

The following activities were conducted as part of the ISM performed by the DET at this site:

- A metal structure housing the hydraulic lifts was removed and disposed.
- Approximately 4,500 ft^2 of asphalt were removed and disposed.
- Approximately 1,000 ft^2 of concrete pad were removed and disposed.
- All hydraulic components, including rams, supply tanks and a vault, were removed, decontaminated, and disposed.
- An estimated 700 cubic yards of contaminated soil containing levels greater than RBCs was removed.
- Confirmation samples were taken of the remaining sidewalls and bottom of the excavated area to ensure compliance with RBCs.
- The site was cleared of all visible debris and all excavated areas were backfilled with clean soil.

- All excavated soil was sampled and characterized as non-hazardous and stockpiled onsite awaiting disposal.

The findings of the RFI soil investigation were used to determine the areas to begin excavation. Immunoassay field samples were taken during excavation as a field screening to determine whether petroleum-related contaminants were present. Following all excavation activities, confirmatory samples were taken at the bottom and sidewalls of all four excavated areas. A total of 16 confirmation samples were taken and analyzed for 4 volatile organics (BTEX), 16 extractable organics (PAHs), and 8 RCRA metals. All 16 samples were below the detection limits for BTEX. Most samples, (13), were below the detection limits for all PAHs. Of the three samples in which PAHs were detected, only one sample contained a benzo(a)pyrene detection (285 μg/kg) above the residential RBC (87 μg/kg). All 16 confirmation samples exceeded the RBC for arsenic. However, of these 16 samples, only one (38.2 mg/kg) exceeded the background reference concentration for arsenic (22.5 mg/kg). All other metals were below the residential RBC value.

No COCs were identified for the surface soil during the RFI. The total surface soil risk under both residential and industrial scenarios was below 1E-06. The revised objective of meeting the Region III RBCs was generally met by the removal of 700 cubic yards of soil. All excavated soil was removed from the site and replaced with clean soil. Confirmation samples were collected to document that the remaining soil met the Region III RBC requirements. Fifteen out of 16 confirmation samples complied with all petroleum related organic RBC requirements.

3.0 REMEDIAL OBJECTIVES

3.1 Soil Remedial Objectives

Because no surface soil COCs were identified for this site, soil remedial objectives were not developed during the RFI. The DET ISM completed at the site resulted in the removal of approximately 700 cubic yards of petroleum-impacted soil. Results of the ISM activities are provided in the DET completion report dated July 7, 1997. Final soil remedial objectives are not required for this site since all risk-based residential surface soil requirements have been met.

3.2 Groundwater Remedial Objectives

The only groundwater COC identified in the RFI was arsenic. The background arsenic concentration in shallow site groundwater is 21.5 μg/L with an MCL value of 50 μg/L. Arsenic exceeded its MCL in only one of four rounds at a single well during the RFI sampling.

Arsenic was considered during the CMS process to determine if it was present in shallow groundwater at consistent concentrations exceeding MCLs. The additional CMS investigations documented that arsenic was not present in site groundwater at concentrations exceeding the MCL. Since MCLs have been met for all parameters at the site, additional groundwater remedial objectives are not required.

4.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

4.1 Soil Remedial Technologies

Identification and screening of soil remedial technologies is not warranted for this CMS Report based on the post-ISM confirmation sample results.

4.2 Groundwater Remedial Technologies

Identification and screening of groundwater remedial technologies is not warranted for this CMS Report based on the results of the additional CMS groundwater sampling. AOC 653 shallow groundwater complies with all MCL levels.

5.0 DETAILED EVALUATION OF ALTERNATIVES

5.1 Evaluation of Soil Remedial Alternatives

Detailed evaluation of soil remedial alternatives is not warranted for this CMS Report based on the post-ISM confirmation sampling results.

5.2 Evaluation of Groundwater Remedial Alternatives

Detailed evaluation of groundwater remedial alternatives is not warranted for this CMS Report. This is based on the results of the additional groundwater sampling performed during the CMS. AOC 653 shallow groundwater is in compliance with all MCL levels.

6.0 RECOMMENDATIONS

6.1 Soil Recommendations

No surface soil COCs were identified for AOC 653. Based on post-ISM confirmation sample results, the petroleum-impacted soil has been removed from the site and AOC 653 is recommended for no further corrective action under the RCRA CMS process.

6.2 Groundwater Recommendations

AOC 653 shallow groundwater is recommended for no further corrective action under the RCRA CMS process based on CMS sampling results that documented that shallow groundwater at the site complies with MCLs.

7.0 PUBLIC INVOLVEMENT PLAN

7.1 General

The following Public Involvement Plan (PIP) is included as part of this report in accordance with the EPA's guidance on RCRA CMS. This PIP reflects and summarizes information prepared and presented in the Navy's Community Relations Plan (CRP), prepared for Charleston Naval Complex in 1995.

Under RCRA, there is no required interaction with the community during the Corrective Measures Study process. Public input is required to be solicited only at the beginning of the permitting process, or during certain permit modifications. Therefore, the Navy has outlined a voluntary program of informing local communities throughout the entire RCRA Corrective Action process. Activities are detailed in the 1995 CRP for the Charleston Naval Complex.

However, because the CMS process results in a modification to the facility's RCRA permit, certain provisions are made to solicit the public's input on the preferred alternative (as the reason for the modification). The requirements are identical to those required for a draft permit.

Two primary objectives are stated in the CRP:

- To initiate and sustain community involvement.
- To provide a mechanism for communicating to the public.

7.2 RFI Public Involvement Plan

To achieve these objectives, the CRP identifies public involvement and outreach activities at each step of the Corrective Action process. For example, the following activities have been designated for the completion of the RFI. All have been accomplished.

- Update and publicize the information repository.
- Continue to publicize the point of contact.
- Update the mailing list.
- Distribute fact sheets and/or write articles to explain RFI findings.
- Inform community leaders of the completion and results of the RFI.
- Update and continue to provide, whenever possible, presentations for informal community groups.
- Update the community on results of the RFI through public Restoration Advisory Board meetings.

7.3 CMS Public Involvement Plan

During the Corrective Measures Study, the following activities will be carried out as part of the Navy's current and ongoing community involvement program.

- Distribute a fact sheet and/or write articles for publication that report CMS recommendations.
- Continue to update the mailing list.
- Continue to respond to requests for speaking engagements.
- Update the community on CMS status through public Restoration Advisory Board meetings.

7.4 Statement of Basis Public Involvement Plan

Upon completion of the Corrective Measures Study, when the preferred alternative has been proposed, the following activities are required if a modification to the RCRA permit is required. If a permit modification is not necessary, the Navy may choose to implement all, some, or none of the following actions, depending on the level of public interest or concern:

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