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DRAFT STATEMENT OF BASIS VOLUME 1 CNC CHARLESTON SC

7/30/1999

ENSAFE

DRAFT STATEMENT OF BASIS

CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Volume I

CTO-029
Contract Number: N62467-89-D-0318

Revision: 0

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina

Prepared by:

EnSafe, Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962

July 30, 1999

Release of this document requires prior notification of the Commanding Officer of the Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
2155 EAGLE DRIVE
NORTH CHARLESTON, S.C. 29419-9010

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, 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)

ENSAFE

ENSAFE INC. ENVIRONMENTAL AND MANAGEMENT CONSULTANTS

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August 10, 1999

Mr. John Litton, P.E.
Director, Division of Hazardous
and Infectious Waste Management
Bureau of Land and Waste Management
SC Department of Health & Environmental Control
8901 Farrow Road
Columbia, SC 29203

RE: Statement of Basis for Zone H, AOC 653

Dear Mr. Litton:

An old internal version of the Draft Statement of Basis for Zone H AOC 653 was inadvertently sent to you on August 6, 1999. Please disregard the one that was previously sent, and review the enclosed instead.

We apologize for any inconvenience this has caused.

Sincerely,

Lisa Brown
Senior Project Manager

cc: Mr. Paul Bergstrand, SCDHEC
Mr. Mihia Mehta, SCDHEC
Mr. Dann J. Spariosu, EPA
Christine Sanford-Coker, SCDHEC Trident District EQC
M.A. Hunt, SOUTHNAVFACENGCOM

DRAFT STATEMENT OF BASIS

CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

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Prepared by:

EnSafe, Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962

July 30, 1999

Release of this document requires prior notification of the Commanding Officer of the Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

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.

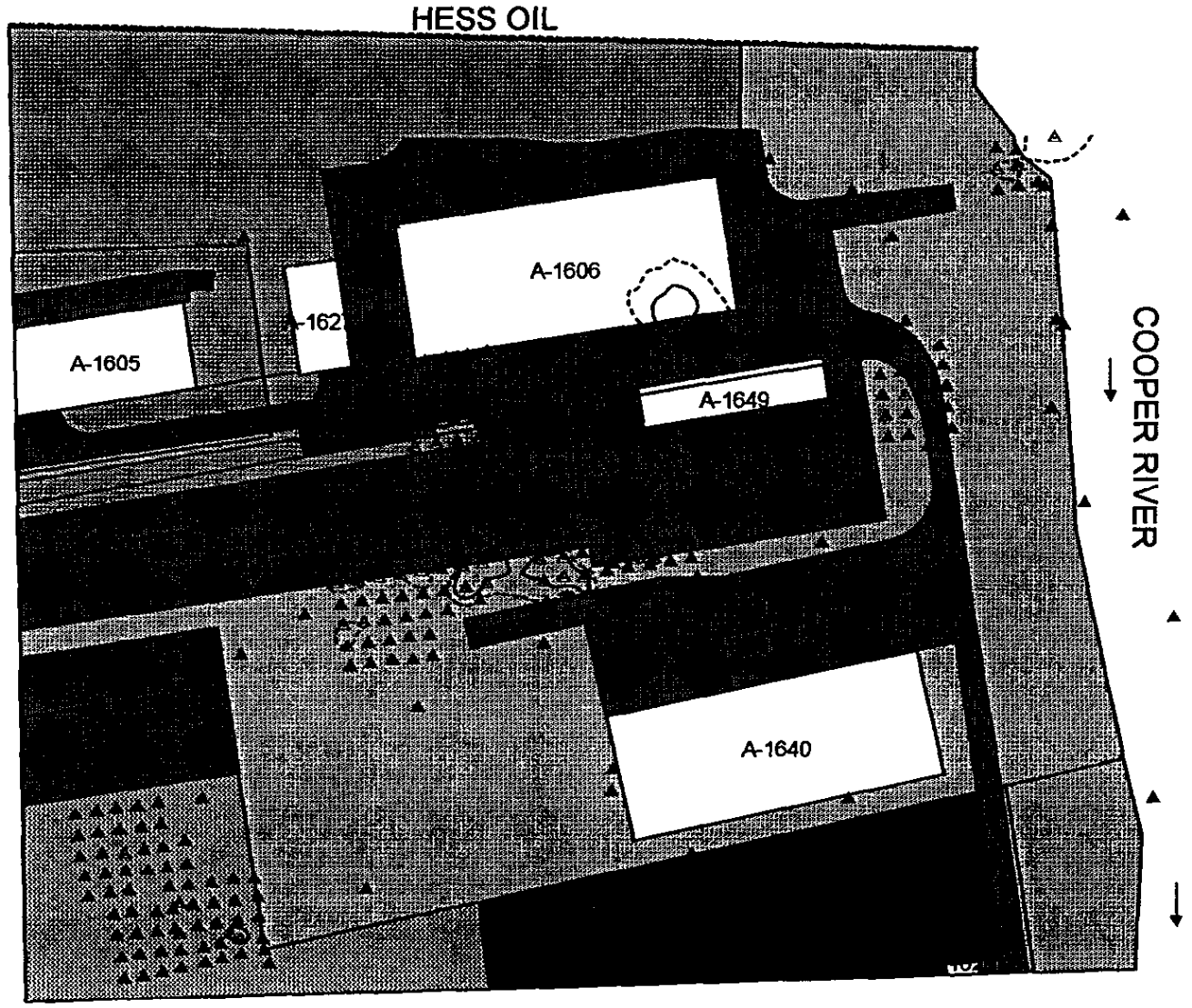
The majority of Combined SWMU 2 currently consists of paved and concreted unused open space that is not presently in use. A movie company has a short-term lease on Building 1606. Buildings 1627, 1640 and 1649 are unoccupied. Building 1605 and the surrounding parking and open storage areas to the northwest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

g:/user/shelley/poly_cov/poly_mxss

EMSAFE | 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.

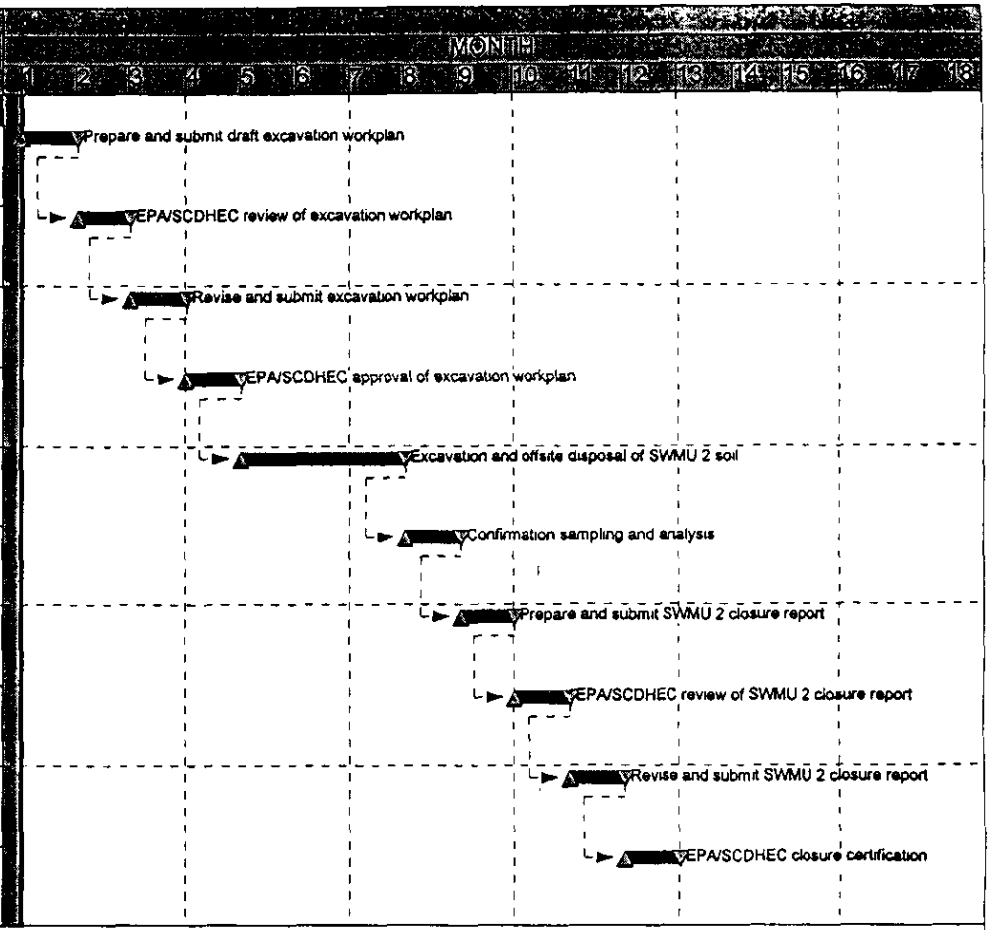
For more information on the proposed remedy for Combined SWMU 2, the Restoration Advisory Board, or the environmental program at the Charleston Naval Complex, please call Tony Hunt at 1-843-820-5525 or write to the address in the box on Page 1.

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

DRAFT STATEMENT OF BASIS
Zone H
SWMU 159
Charleston Naval Complex
Charleston, South Carolina

Site:	Former Waste Accumulation Area
Chemical of Concern:	None
Media:	None
Proposed Remedy:	No Further Action

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 Solid Waste Management Unit (SWMU) 159 at the Charleston Naval Complex in Charleston, South Carolina. The RFI and CMS addressed environmental concerns at the former waste accumulation area near Building 665 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 H RFI and SWMU 159 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 SWMU 159. Section 2 explains the public involvement process.

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

Oversight of the Zone H RFI and SWMU 159 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 alternative described in this document and the CMS report, as well as others not addressed therein.

Because selection of a final remedy for SWMU 159 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 US 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

comments and/or concerns regarding selection of a remedial alternative for SWMU 159.

The RFI and CMS reports can be found in the Information Repository (i.e., 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
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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 for 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

SWMU 159 is south of Buildings 655 and 665 in the south-central portion of Zone H (Figure 1). Building 655 was the former base commissary and Building 665 was the former base package store. This SWMU was a former waste accumulation area located in a low area near the southwest corner of Building 665. The area 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 during the RFI to assess any residual contamination from the former storage area.

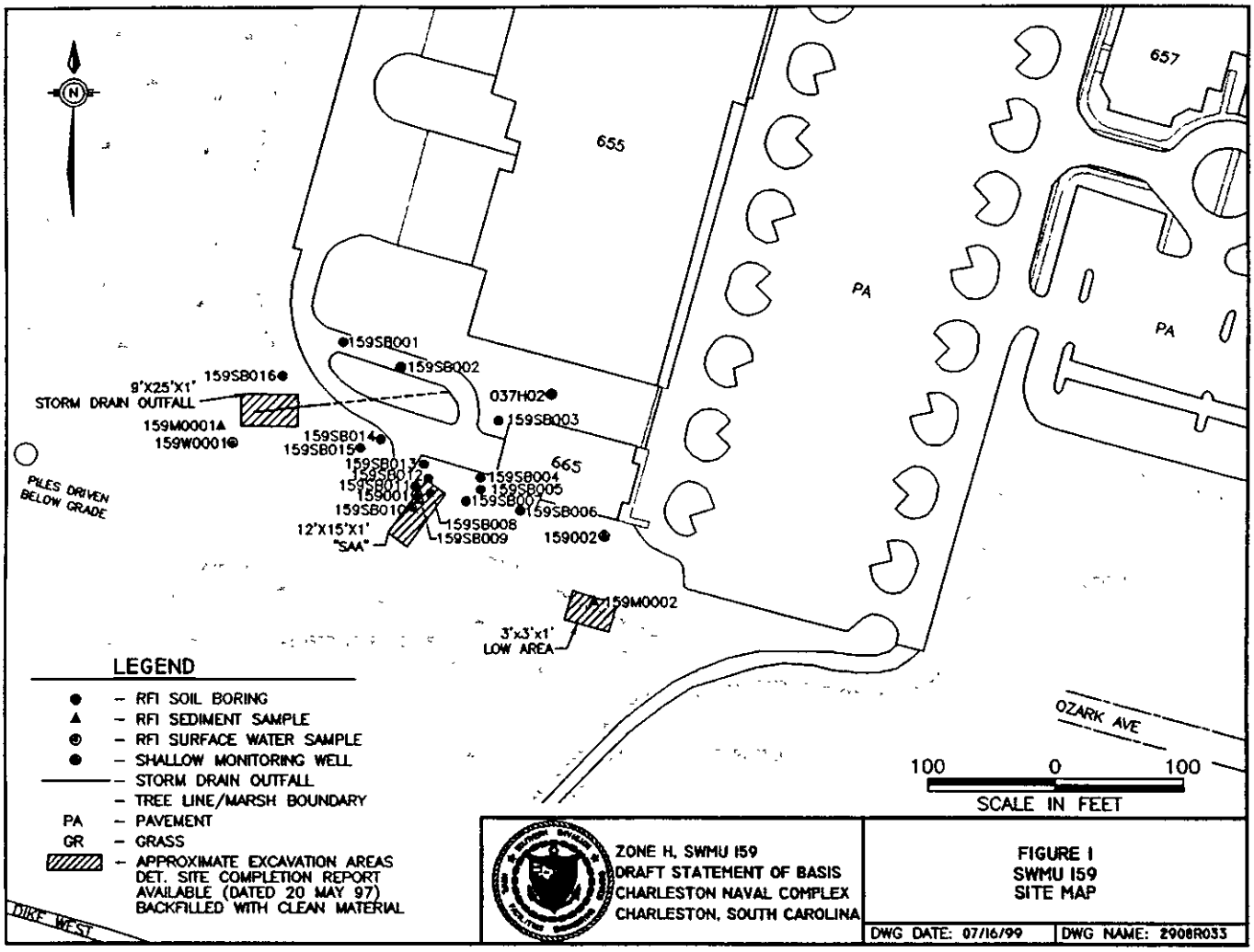
SWMU 159 is not currently used by either federal or nonfederal tenants. According to the Charleston Naval Complex Redevelopment Authority, this area will likely be used for industrial purposes in the future. A tidal marsh adjacent to SWMU 159 could limit potential development through wetland permitting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

Nineteen soil samples were collected during the 1995 RFI 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 area described above (Figure 1). Soil was not sampled during the CMS investigations.

Groundwater at SWMU 159 was not monitored during the RFI, but the project team requested that it be addressed in the CMS process due to potential groundwater concerns. Two wells, installed during the CMS to monitor shallow groundwater for VOCs, were sampled in three consecutive quarters.

An Interim Stabilization Measure (ISM) was implemented by the Navy Environmental Detachment (DET) at the site in September 1996. An interim measure is designed to eliminate sources of environmental contamination or limit the spread of environmental contaminants prior to completion of the CMS. A May 20, 1997 DET ISM completion report summarizes these activities, which are listed below.

- An estimated 16 cubic yards of soil and sediment were removed that contained contaminant levels greater than Risk-Based Concentrations (RBCs). RBCs are chemical- and medium-specific concentrations based on selected exposure assumptions (such as exposure frequency and duration, land use condition, intake rate, etc.) and target risk levels.



- Confirmation samples were collected from 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 nonhazardous, and transported offsite for disposal.

4.0 SUMMARY OF SITE RISKS

Human Health Risks — Soil

Benzo(a)pyrene equivalents (BEQs) were found in one RFI soil sample at concentrations high enough to identify them as site chemicals of concern (COCs). These are the only COCs identified in site surface soil. A COC is considered to be any chemical that contributes to a cumulative risk level of 1E-06 or greater and/or a cumulative hazard index above 1.0. This one sample presented a surface soil point risk greater than 1E-06 above background for a residential scenario. A cancer risk level of 1E-06 means that one person out of a million is at risk of developing cancer if the person is directly exposed to site contamination over an extended period of time. This boring is surrounded by borings that yielded samples with concentrations less than the BEQ Risk-Based Screening Level (RBSL). No site point risk exceeded 1E-06 in the industrial scenario, and no site point hazard quotient exceeded 0.1 in either the residential or industrial scenario. For noncarcinogens, other

toxic effects are considered possible if the hazard quotient exceeds 1.

While not identified as a COC, petroleum hydrocarbons (as indeterminate lubricating oil [ILO]) were detected in all 19 soil samples. ILO exceeded its screening level of 100 mg/kg in two surface samples and one subsurface sample.

The site ISM completed by the DET removed the soil around the sample point that had produced the point risk greater than 1E-06 above background. Removal of this point has met the risk-based residential surface soil requirements, and no other remedial actions are required.

Human Health Risks — Groundwater

Groundwater was not monitored during the SWMU 159 RFI. When trichloroethene (TCE) – a toxic, cancer-causing chlorinated solvent typically used for degreasing parts, tools, etc. – was detected in 14 out of 16 surface soil samples, the project team requested that SWMU 159 groundwater be sampled during the CMS. Although soil concentrations were well below the RBSL for TCE, the team wanted to definitively address potential groundwater concerns.

Two shallow groundwater monitoring wells were constructed during the CMS in the area of greatest potential for TCE contamination. Groundwater was sampled for three rounds to confirm or refute the presence of chlorinated solvents and to determine if remedial action was required. No TCE was detected in either of the CMS wells during any of the three sampling rounds (Table 1). Since drinking water maximum contaminant levels (MCLs) have been met for all parameters at the site, further groundwater remedial objectives are not required.

Human Health Risks — Sediment

No COCs were identified in sediment at SWMU 159, and sediment did not present any human health risks greater than 1E-06 for the residential scenario. SWMU 159 sediment was included in the CMS process on the basis of petroleum hydrocarbon concentrations that exceeded the RBSL of 100 mg/kg at two sample locations. Soil surrounding both sample points was excavated during the DET ISM and replaced with clean soil.

Table 1
TCE Groundwater Data at SWMU 159

Sample Number	Date	TCE (µg/L)
		MCL=5
159-G-W001-01	08/13/98	5 U
159-G-W001-02	11/12/98	5 U
159-G-WC01-01	03/23/99	5 U
159-G-W002-01	08/13/98	5 U
159-G-W002-02	11/11/98	5 U
159-G-WC02-01	03/19/99	5 U

Notes
TCE — Trichloroethene
U — Not detected at the listed numerical quantitation limit
Boxed value indicates sample concentration exceeded the screening value
µg/L — micrograms per liter

Human Health Risks — Surface Water

No organic compounds were detected in the single surface water sample collected at SWMU 159. No reference (background) surface water data were collected as part of the Zone H RFI.

Ecological Risk

SWMU 159 is located in Area of Ecological Concern (AEC)-1, and partially included in Subzone H-2. A relatively high risk to soil infaunal organisms is predicted in Subzone H-2 from inorganic ecological chemicals of potential concern (ECPCs) (zinc, copper, and lead). Infaunal organisms are animals (invertebrates or vertebrates) that live on top of or within sediments (e.g., small crustaceans). No risk is expected from organic ECPCs in H-2 soil. For terrestrial wildlife (animals who spend their entire lifespan on land such as deer, swine, rabbits, and box turtles), Subzone H-2 copper, zinc, cadmium, and manganese concentrations contributed to a hazard index (HI) value predicting lethal effects to rabbits. This HI was derived primarily from soil samples collected at another SWMU in Subzone H-2. Risk to young herbaceous species (plants, mostly shrubs, having little woody tissue and often lasting for only one growing season) from soil ECPCs (copper, lead, and zinc) is also predicted in Subzone H-2. Although two SWMU 159 sediment samples exhibited high concentrations of metals and SVOCs, the samples were collected in narrow drainage ditches which could not support nor pose significant risk to site-specific aquatic wildlife (i.e., organisms typically associated with water bodies such as beavers, otters, and alligators). Furthermore, the DET excavated and

disposed of sediments surrounding these two sample points during the ISM.

Contaminant Fate and Transport
Soil-to-Groundwater
No groundwater samples were collected from SWMU 159 during the RFI for qualitative screening of the soil-to-groundwater migration pathway. Quantitative screening identified four constituents (barium, copper, selenium, and trichloroethene) that marginally exceeded their soil screening criteria. These constituents were detected above groundwater protection soil screening levels (SSLs) or background upper tolerance limits (UTLs) in only one or two soil samples each. This limited number at concentrations slightly above conservative screening levels is not expected to threaten the shallow aquifer. These findings indicate that SWMU 159 soil concentrations are protective of the shallow aquifer.

Groundwater-to-Surface Water
The RFI determined that the groundwater-to-surface water transport route is not a concern at SWMU 159.

Surface Soil-to-Sediment/Surface Water
Numerous organics and inorganics were detected in both media at similar concentrations. This suggests that surface-soil erosion forming sedimentary deposits in the adjacent tidal estuary may be a significant factor governing fate and transport of contaminants. Three constituents (bis[2-ethylhexyl]phthalate, heptachlor, and heptachlor epoxide) were detected in sediment at a significantly higher concentration than in surface soil. 2-Butanone and butylbenzylphthalate were detected in sediment only once and cannot be related to a potential surface soil source. No constituents were detected in SWMU 159 surface-water samples above salt-water chronic Water Quality Criteria (WQC). These findings suggest that surface soil concentrations are protective of the surface water environment assessed in the SWMU 159 RFI.

Surface Soil-to-Air
The RFI determined that the surface soil-to-air transport route is not a concern at SWMU 159.

5.0 PROPOSED REMEDY
The US Navy proposes No Further Action as the optimal solution for addressing soil and groundwater at this site. The DET removed approximately 16 cubic yards of contaminated soil and sediment from SWMU 159 during an ISM. Confirmation soil sampling performed after completion of the ISM determined that this removal had met the established clean-up requirements. Groundwater monitored during the CMS determined that site shallow groundwater complies with all regulatory requirements. The US Navy therefore proposes no further corrective action at this site under the RCRA CMS process, although new information or public input could affect the final remedy decision.

6.0 SCOPE OF CORRECTIVE ACTION AND REMEDIATION OBJECTIVE
Soil
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. Soil corrective action is not required since the DET ISM removed the contaminated soil, and the remaining soil meets the residential risk-based requirements.

Groundwater
Based on 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.

Sediment
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. Sediment corrective action is not required since the DET ISM removed the petroleum hydrocarbon-contaminated sediments, and no other sediment COCs were identified.

7.0 SUMMARY OF ALTERNATIVES
Soil
Evaluation of soil remedial alternatives is not warranted for this site since further soil corrective action is not required.

Groundwater
Evaluation of groundwater remedial alternatives is not warranted for this site since groundwater corrective action is not required.

Sediment

Evaluation of sediment remedial alternatives is not warranted for this site since further sediment corrective action is not required.

8.0 EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES

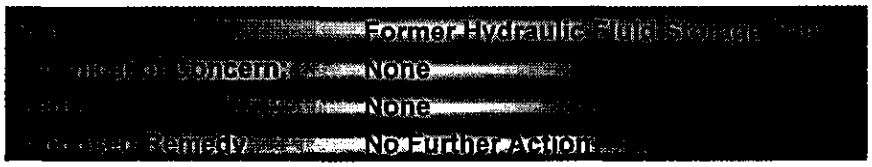
Since no further soil, groundwater, or sediment corrective action is required at SWMU 159, no remedial alternatives were developed and no evaluation of alternatives is required.

9.0 SCHEDULE

An estimated time line for corrective action milestones and document submittals is not necessary as no further action is proposed for SWMU 159.

For more information on the proposed remedy for SWMU 159, 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.

DRAFT STATEMENT OF BASIS
Zone H
AOC 653
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 Area of Concern (AOC) 653 at the Charleston Naval Complex in Charleston, South Carolina. The RFI and CMS addressed environmental concerns at a former hydraulic fluid storage tank site at a former automotive hobby shop complex.

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 H RFI and AOC 653 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 AOC 653. Section 2 explains the public involvement process.

Oversight of the Zone H RFI and AOC 653 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 alternative described in this document and the CMS report, as well as others not addressed therein.

Because selection of a final remedy for AOC 653 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 US 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:

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3.0 SITE BACKGROUND

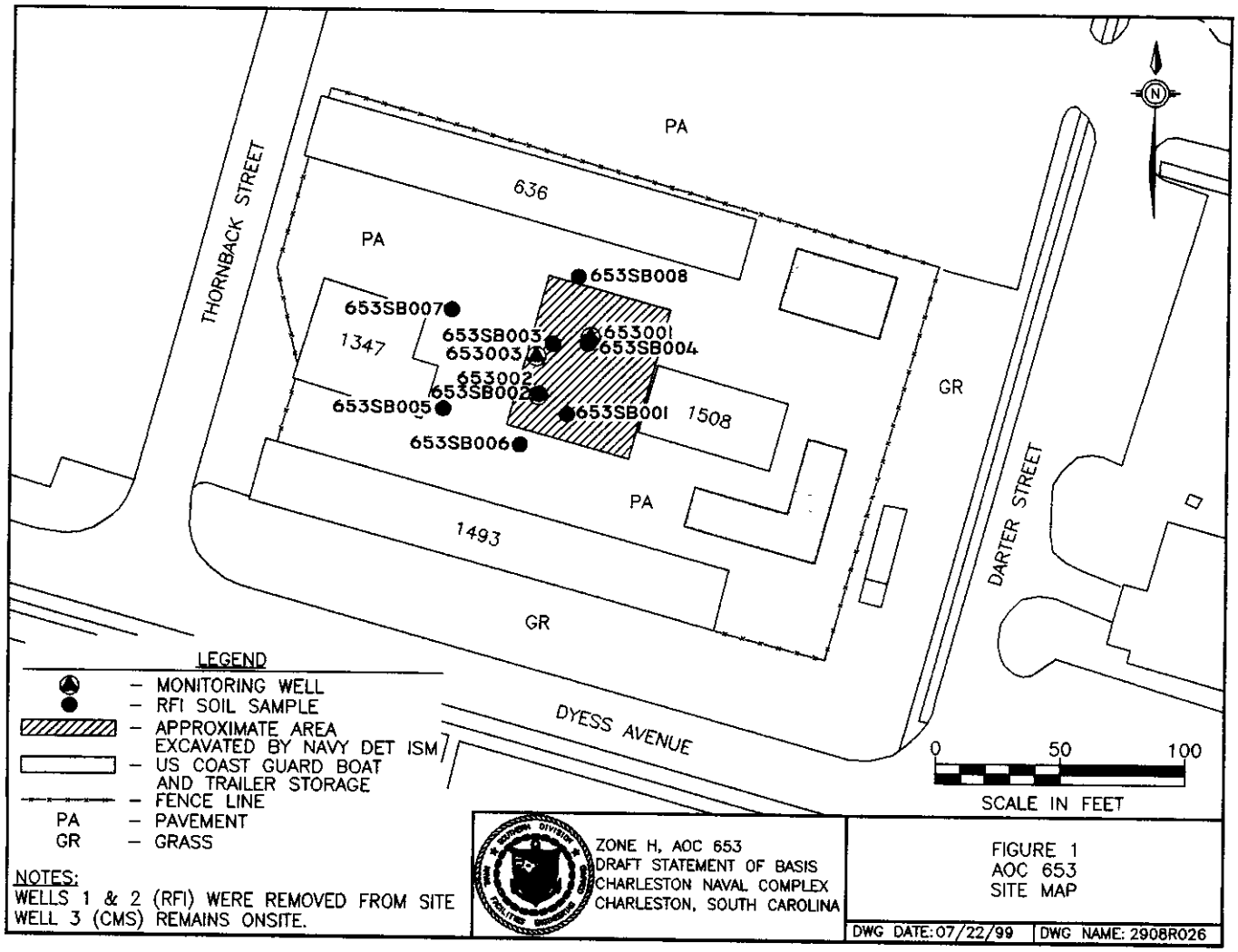
AOC 653 is a former hydraulic fluid storage tank at the west end of Building 1508 (Figure 1), one of four buildings that comprised the former automotive hobby shop complex. In 1972, the surface area around the hobby shop was soil or some other unconsolidated material. In 1974, it was paved and auto lifts were added to the west end of Building 1508. Various paints, solvents, thinners and petroleum products have been used and stored onsite. Use of the tank was initially discontinued due to suspected leakage, and the tank was later removed by the Navy Environmental Detachment (DET) during a December 1996 Interim Stabilization Measure (ISM). Soil and groundwater were sampled at AOC 653 to investigate possible residual contamination from the leaking tank and other possible spills.

The AOC 653 site is currently fenced and used for boat and trailer storage by the United States Coast Guard, a recent federal tenant of the former naval base. The area excavated by the DET during the ISM has been backfilled with clean soil and the surface has been covered 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 industrial purposes in the future, which is consistent with its current use.

Soil samples were collected during the 1995 RFI. 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 was analyzed for SVOCs, pesticides, and dioxins. Soil was sampled near the hydraulic tank to identify any possible contamination (Figure 1). No surface soil chemicals of concern (COCs) were identified at this site, and no soil was sampled during the CMS. A COC is considered to be any chemical that contributes to a cumulative risk level of 1E-06 or greater and/or a cumulative hazard index above 1.0. A cancer risk level of 1E-06 means that one person out of a million is at risk of developing cancer if the person is directly exposed to site contamination for an extended period of time.

Two monitoring wells were installed during the RFI 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 objective of the DET ISM was to remove petroleum-related soil contamination from the site.



The original guidance was to remove and dispose of any contaminated soil with TPH levels greater than 100 milligrams per kilogram (mg/kg). During the ISM, however, the controlling guidance was changed to excavate soil with petroleum-related contamination exceeding the USEPA Region III Residential Risk-Based Concentrations (RBCs). RBCs are chemical- and medium-specific concentrations based on selected exposure assumptions (such as exposure frequency and duration, land use condition, intake rate, etc.) and target risk levels. Residential/industrial soil RBCs are concentrations in soil that are expected to be protective of human health under residential/industrial land use conditions.

A July 7, 1997 DET ISM completion report summarizes these activities, which are listed below.

- A metal structure housing the hydraulic lifts was removed and disposed.
- Approximately 4,500 ft^2 of asphalt was removed and disposed.
- Approximately 1,000 ft^2 of concrete pad was removed and disposed.
- All hydraulic components, including rams, supply tanks and a vault, were removed, decontaminated, and disposed.
- An estimated 700 cubic yards of soil was removed that contained contaminant levels greater than RBCs.

- Confirmation samples were collected from the remaining sidewalls and bottom of the excavation 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 nonhazardous, and stockpiled onsite for disposal.

4.0 SUMMARY OF SITE RISKS

Because the following risk summaries were prepared before the DET implemented the ISM at AOC 653, some (if not all) of the following risks may no longer apply to the site.

Human Health Risks — Soil

The revised ISM objective of meeting USEPA Region III RBCs was generally met by removal of 700 cubic yards of soil. All excavated soil was removed from the site and replaced with clean soil, and confirmation samples were collected to document that the remaining soil met the Region III RBC requirements for benzene, toluene, ethylbenzene, xylenes, naphthalene, polynuclear aromatic hydrocarbons (PAHs), and RCRA metals. Fifteen out of 16 confirmation samples complied with all petroleum-related RBC requirements.

The estimated risk of developing cancer from exposure to surface soil constituents is less than one in one million under either residential or industrial land use conditions.

No additional soil was sampled during the CMS investigations.

Human Health Risks — Groundwater

AOC 653 was included in the CMS process because arsenic was found in site groundwater during the RFI. Arsenic, the sole contributor to groundwater risk and hazard at this site, was detected at concentrations exceeding its drinking water maximum contaminant level (MCL) of 50 µg/L in one of the two site monitoring wells. MCLs, set by the USEPA, are based on a compound's demonstrated ability to adversely affect human health if the concentration is above specified levels in the primary drinking water supply. A single monitoring well was installed in the center of the site during the CMS, to replace the original two RFI wells that were removed during the DET ISM. Two rounds of samples (653-G-W003-02 and 653-G-W003-03) collected from the new CMS well showed that arsenic in groundwater did not exceed its MCL (Table 1)

Table 1
Arsenic in Groundwater Data at AOC 653

Sample Number	Date	Arsenic (µg/L)
		MCL = 50
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

Notes
J — An estimated quantity
U — Not detected at the listed numerical quantitation limit
UJ — Not detected at the estimated numerical quantitation limit
Boxed value indicates sample concentration exceeded MCL
µg/L — micrograms per liter

Ecological Risks

Ecological risk is not a concern at AOC 653 because there is no habitat for ecological receptors in this generally industrialized section of Zone H.

Contaminant Fate and Transport

Soil-to-Groundwater

Acrylonitrile, barium, lead, methyl parathion, and 4-nitrophenol were detected in soil at concentrations exceeding either groundwater protection soil screening levels (SSLs) or background upper tolerance limits (UTLs). Acrylonitrile and methyl parathion were not detected in AOC 653 subsurface soil. 4-Nitrophenol was detected in one subsurface soil sample, and lead and barium were detected above their background UTLs in only one or two soil samples. None of these compounds were detected in AOC 653 shallow groundwater. Although conservative screening indicates the potential for isolated soil-to-groundwater migration, the limited

extent of these constituents in AOC 653 soil and their absence from shallow groundwater suggest that significant migration is unlikely. Furthermore, the DET removed and disposed of most of this soil during the ISM.

Groundwater-to-Surface Water

As previously stated, RFI sampling detected arsenic in shallow groundwater exceeding its MCL. Subsequent CMS sampling, however, did not produce evidence of additional MCL exceedance. Considering soil's neutral to high pH, arsenic is expected to precipitate out of the water and adhere to the soil matrix, rather than migrate in groundwater. There is no surface water at AOC 653, so qualitative screening was not performed for the groundwater-to-surface water migration pathway. The Cooper River is the closest surface water body to AOC 653, and will be investigated during the Zone J RFI. Groundwater travel time from AOC 653 to the Cooper River, about 200 yards from the site, is an estimated 171 years. Based on predicted travel times to surface water (not considering the aquifer's attenuative capacity) and the dilutional capacity of the receiving stream, impact to surface water is not expected to be significant.

Surface Soil-to-Air

No VOC's maximum surface soil concentration exceeded its soil-to-air volatilization screening level. A conservative soil-to-air screening value of 10,000 mg/kg was used for 2-butanone, which means that the soil-to-air migration pathway is not expected to be significant

5.0 PROPOSED REMEDY

The US Navy proposes No Further Action as the optimal solution for addressing soil and groundwater at this site. No surface soil COCs were identified for AOC 653. The ISM at AOC 653 was performed to address petroleum-impacted soil, and the DET removed approximately 700 cubic yards of contaminated soil from the site. Based on post-ISM confirmation sample results, no petroleum-impacted soil remains onsite and remaining soil satisfies residential risk-based requirements.

CMS sampling results also document that shallow site groundwater complies with MCLs. The US Navy therefore proposes no further corrective action at this site under the RCRA CMS process, although new information or public input could affect the final remedy decision.

6.0 SCOPE OF CORRECTIVE ACTION AND REMEDIATION OBJECTIVE

Soil

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. Soil corrective action is not required since the DET ISM removed the contaminated soil, and the remaining soil meets residential risk-based requirements.

Groundwater

Based on CMS sampling results that documented shallow groundwater compliance with all MCLs, AOC 653 shallow groundwater is recommended for no further corrective action under the RCRA CMS process.

7.0 SUMMARY OF ALTERNATIVES

Soil

Evaluation of soil remedial alternatives is not warranted for this site since further soil corrective action is not required.

Groundwater

Evaluation of groundwater remedial alternatives is not warranted for this site since groundwater corrective action is not required.

8.0 EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES

Since no further soil or groundwater corrective action is required at AOC 653, no remedial alternatives were developed and no evaluation of alternatives is required.

9.0 SCHEDULE

An estimated time line for corrective action milestones and document submittals is not necessary, as no further action is proposed for AOC 653.

For more information on the proposed remedy for AOC 653, 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.