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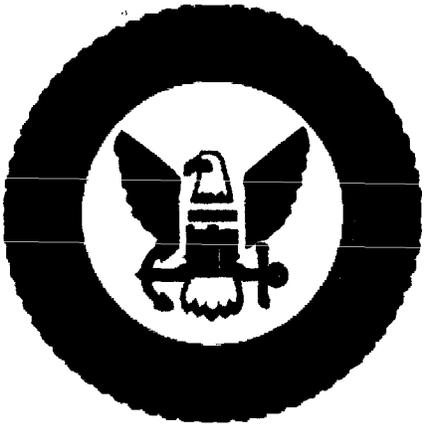
COMPLETION REPORT INTERIM MEASURE FOR SOLID WASTE MANAGEMENT UNIT 2  
(SWMU 2) VOLUME 1 OF 3 WITH TRANSMITTAL CNC CHARLESTON SC  
11/22/1999  
NAVFAC SOUTHERN



# COMPLETION REPORT

INTERIM MEASURE FOR  
SWMU 2  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

Volume 1 of 3



Prepared for:

DEPARTMENT OF THE NAVY  
SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
CHARLESTON SC

Contract Number: CHNPO9923

Prepared by:

**SOUTH CAROLINA RESEARCH AUTHORITY**  
Environmental Enterprise Group  
1899 North Hobson Avenue, Bldg. 30  
North Charleston, SC 29405-2106



November 29, 1999



**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 18B1

22 November, 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 FINAL COMPLETION REPORT FOR SWMU 2 INTERIM  
MEASURE

Dear Mr. Litton,

The purpose of this letter is to submit the Final Completion Report for SWMU 2 Interim Measure at Naval Base Charleston. The Completion Report is submitted to fulfill the requirements of condition II.F.3(b) of the RCRA Part B permit issued to the Navy by the South Carolina Department of Health and Environmental Control and U.S. Environmental Protection Agency.

We request that the Department and the EPA review the report and file for future reference. If you should have any questions, please contact Amy Daniel or myself at (803) 743-9985 and (803) 820-5525 respectively.

Sincerely,

A handwritten signature in black ink that reads "M. A. Hunt".

M.A.HUNT, P.E.  
BRAC Environmental Coordinator  
BRAC Division

Encl: Final SWMU 2 Interim Measure Completion Report

Copy to:  
SCDHEC (3)  
USEPA (Dann Spariosu)  
SOUTHNAVFACENGCOM (Matthew Hunt)  
CSO Naval Base Charleston (Amy Daniel)



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<http://www.eeg-scra.org>

---

November 29, 1999  
Ser: 083

Delphinus Engineering (Al Stoll)  
93 Monte Sano Drive  
Hanahan, SC 29406

Re: Completion Report for Charleston Naval Complex (CNC) Solid Waste Management Unit (SWMU) 2.

South Carolina Research Authority (SCRA), Environmental Enterprise Group was contracted to generate a Completion Report for SWMU 2 per purchase requisition No. CHNPO9923. The enclosed report documents the actions performed at SWMU 2.

Questions or information concerning this report should be addressed to Tammy L. Gunter at (843) 202-8061 or Jed Heames at 202-8060.

Respectfully,

E.R. Dearhart  
SCRA, Vice-President  
Environmental Enterprise Group

**COMPLETION REPORT**  
**Interim Measure for**  
**SWMU 2**  
**Naval Base Charleston**  
**Charleston, SC**

Engineering Branch Head: 

Date: 11-29-99

Prepared By: 

Date: 11-29-99

Site work for this Interim Measure was completed by SUPSHIP, Environmental Detachment Charleston. This report is being submitted by South Carolina Research Authority (SCRA) Environmental Enterprise Group (EEG) established as a result of the US Navy's privatization of SUPSHIP Environmental Detachment Charleston on 13 September 1999.

**DOCUMENT GENERATED BY:**  
**SOUTH CAROLINA RESEARCH AUTHORITY**  
**Environmental Enterprise Group**  
1899 NORTH HOBSON AVENUE  
NORTH CHARLESTON, SC 29405



# COMPLETION REPORT

INTERIM MEASURE FOR  
SWMU 2  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

Volume 1 of 3



Prepared for:

DEPARTMENT OF THE NAVY  
SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
CHARLESTON SC

Contract Number: CHNPO9923



Prepared by:

SOUTH CAROLINA RESEARCH AUTHORITY  
Environmental Enterprise Group  
1899 North Hobson Avenue, Bldg. 30  
North Charleston, SC 29405-2106

November 29, 1999

## TABLE OF CONTENTS

<b><u>Section</u></b>	<b><u>Page</u></b>
Table of Contents .....	ii
List of Appendices .....	iii
Acronyms, Abbreviations and Symbols .....	iv
1. Introduction .....	1-1
1.1 Installation Restoration Program .....	1-1
1.1.1 Naval Base Charleston IR Program	
1.2 Interim Measures .....	1-1
1.3 History .....	1-1
1.4 SWMU 2 Interim Measure.....	1-2
2. Interim Measure Execution .....	2-1
2.1 Actions Required by Interim Measure .....	2-1
2.2 Project Summary .....	2-1
2.2.1 Site Delineation .....	2-1
2.2.2 Rail Spur .....	2-2
2.2.3 Concrete/Asphalt Removal .....	2-2
2.2.4 Excavation .....	2-2
2.3 Plan Modifications and Justification .....	2-3
3. Interim Measure Outcome .....	3-1
3.1 Site Conditions Following Completion of Work .....	3-1

## TABLE OF CONTENTS (cont'd)

### Section

### Page

4.	Sampling .....	4-1
4.1	Sampling Phase's and Results .....	4-1
4.1.1	Site Delineation .....	4-1
4.1.2	Confirmatory Soil Sampling and Analysis.....	4-1
4.1.3	Waste Characterization Sampling and Analysis .....	4-2
5.	Waste Generation .....	5-1
5.1	Non-Hazardous Waste .....	5-1
5.1.1	Concrete, Asphalt, and Creosote Timbers.....	5-1
5.2	Hazardous Waste .....	5-1
5.2.1	Soil and Concrete.....	5-1

### **List of Figures**

Figure 1: Completion Report Site Map

Figure 2: 1998 Site Delineation Samples

Figure 3: Excavation Boundary with Confirmation Sample Locations

### **List of Tables**

Table 1: Confirmation Sample Results

Table 2: Soil TCLP Data

Table 3: Concrete TCLP Data

### **List of Appendices**

Figures.....	Appendix A
Pictures.....	Appendix B

## ACRONYMS, ABBREVIATIONS and SYMBOL

AOC	Area of Concern
BLS	Below Land Surface
CMS	Corrective Measure Studies
CY	Cubic Yard
DERP	Defense Environmental Restoration Program
DET	Environmental Detachment Charleston
DON	Department of the Navy
DRMO	Defense Reutilization and Marketing Office
EIC	Engineer-In-Charge
IM	Interim Measure
mg/kg	milligrams/kilogram
IR	Installation Restoration
OSWER	Office of Solid Waste and Environmental Response
Pb	Lead
ppm	Parts per million
RBC	Risk-based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
ROC	Run-of-Crush
SARA	Superfund Amendments and Reauthorization Act
SCDHEC	South Carolina Department of Health and Environmental Control
SOUTHDIV	Southern Division Naval Facilities Command
SUPSHIP	Supervisor of Shipbuilding, Conversion and Repair, USN
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TSDF	Treatment, Storage, Disposal Facility
USN	United States Navy

## **1. INTRODUCTION**

**1.1 INSTALLATION RESTORATION PROGRAM.** The purpose of the Department of the Navy (DON) Installation Restoration (IR) Program is to identify, assess, characterize and clean up or control contamination from past hazardous waste disposal operations and hazardous material spills at Navy and Marine Corps Activities. The Defense Environmental Restoration Program (DERP) is codified in the Superfund Amendments and Reauthorization Act (SARA) Section 211 (10 USC 2701). The IR Program is a component of DERP.

**1.1.1 Naval Complex Charleston IR Program.** At Naval Complex Charleston, a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) was prepared which divided the Naval Base into zones and identified Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) within each zone. The RFA evaluated each SWMU and AOC and determined which sites required further investigation. Based on the RFA, a RCRA Facility Investigation (RFI) work plan has been or is being prepared for each zone containing SWMUs and AOCs requiring further investigation. On completion of the RFI for each zone, a RFI report will be prepared for that zone. The RFI reports will identify SWMUs and AOCs containing wastes requiring remediation. Eventually, Corrective Measures Studies (CMSs) will be prepared to determine the best means of remediating each site.

**1.2 INTERIM MEASURES.** Interim Measures (IM) performed as part of the IR Program are intended to eliminate sources of environmental contamination or limit the spread of environmental contaminants prior to the completion of the RFI Corrective Measures Study (CMS).

**1.3 HISTORY.** SWMU 2 is the site of the former Defense Reutilization and Marketing Office (DRMO) storage area and salvage yard located in Zone A of the Charleston Naval Complex. A site map (Figure 1) showing the SWMU 2 area is included in Appendix A. The approximately 6-acre area was used to store recovered lead from lead-acid submarine batteries from the mid-1960s until

1984. Recovered materials from other areas of the base were placed in rail cars and transferred to the site for storage until it could be sold to a salvage contractor.

Between October of 1995 and January of 1997, Ensafe/Allen & Hoshall conducted investigative sampling as part of the RFI process. The results of the investigation revealed elevated lead levels in the soil above clean levels established for the Naval Complex. Information gathered from the investigation is documented in the August 1998 Zone A RFI Report, Volume II, Section 10. Figure 2 in this document includes Ensafe/Allen & Hoshall sample locations and results as reported in the Zone A RFI report. Lead cleanup levels defined for the Naval Complex was 400 ppm for residential and 1300 ppm for industrial use.

In 1998 the Environmental Detachment Charleston (DET) was tasked by Southern Division Naval Facilities Command (SOUTHDIV) to delineate the areas exceeding clean levels found by Ensafe/Allen & Hoshall. The data gathered from the delineation by the DET was used to define the area for a remedial action. Figure 2 represents the data generated from the site delineation.

**1.4 SWMU 2 INTERIM MEASURES.** After the completion of the RCRA Facilities Investigation (RFI), it was decided by SOUTHDIV that an Interim Measure would be performed by Supervisor of Shipbuilding, Conversion, and Repair (SUPSHIP), United States Navy (USN), Portsmouth Virginia Environmental Detachment Charleston (DET). The objective of this Interim Measure was to remove soils and concrete greater than 400 ppm (residential clean level) from areas delineated in 1998. Waste characterized as hazardous was to be sent to a landfill certified to handle hazardous wastes. The removal of the source was to continue until the sampling program indicated with reasonable confidence that the concentrations of contaminants analyzed were within limits (residential levels) specified for this site.

This Interim Measure is consistent with the ultimate cleanup objective of the site and is not intended to circumvent the public participation process inherent within environmental cleanup under RCRA authority.

## **2. INTERIM MEASURE EXECUTION**

**2.1 ACTIONS REQUIRED BY INTERIM MEASURE WORK PLAN.** The required actions per the IM Work Plan were to remove and dispose approximately 6,000 tons of contaminated soil, 850 tons of contaminated concrete and 2,450 tons of non-hazardous debris. Upon project completion, the areas excavated were to be back-filled and graded existing conditions. Excavation of contaminated sources was performed to the maximum extent possible. A total of 8,320.44 tons of contaminated soil and concrete and approximately 1,366 tons of non-hazardous debris were removed at project completion.

### **2.2 PROJECT SUMMARY**

**2.2.1 Site Delineation.** In 1998, the DET was tasked by SOUTHDIV to delineate soil borings exceeding residential clean levels for lead (400 mg/kg) as reported in the August 1998 RFI Report. Figure 2 shows the locations of RFI soil borings described as “ENSAFE Sample” in the Legend. Soil boring locations exceeding 400 mg/kg were delineated using a sample-grid system. A typical sample-grid included an area encompassing the existing RFI sample location. Samples were collected by the DET within the grid area extending 20' incrementally from the RFI sample location in the X and Y direction. Samples were collected at the first and/or second interval based on the sample areas usage and the RFI investigation results. Grid areas were grouped into eight zones as shown in Figure 2. Statistically, approximately 335 soil borings were collected and tested for Total Lead. Approximately 19 samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) lead to determine the toxicity of the soil for waste characterization. See Figure 2 in Appendix A for soil boring locations and zones.

The data collected during the site delineation in 1998 illustrated the extent of lead contamination present at SWMU 2. This information became the footprint for the removal action at SWMU 2.

**2.2.2 Rail Spur.** An existing rail spur ran east to west through portions of the excavation boundary. The rail spur was used historically to transfer recovered materials to the site. An approximately 550` section of the rail spur was removed in order to access the contaminated soil. Debris generated from the removal of the rail spur, such as concrete, asphalt, and creosote timbers, was removed, placed in containers and transported to a Subtitle D landfill (Chambers) for disposal.

**2.2.3 Concrete/Asphalt Removal.** Concrete and asphalt covered approximately 80% of the area requiring soil removal. The project commenced on 02 July 1999 with the process of removing concrete and asphalt in the areas delineated for soil removal. Concrete and asphalt characterized as non-hazardous was placed inside containers, which were transported to Chambers Landfill. A section of concrete slab, characterized as hazardous, was left in place until soil removal operations were to begin.

Observations noted during the concrete/asphalt removal operations, was the uncovering of a small, debris-filled landfill located in the west end of Zone 5. (Refer to Figure 2 for zone locations.) The debris field encompassed an approximately 55` X 30` area and consisted of various types of debris such as scrap metal, rigging equipment, wood, and soil. This debris mixture was approximately 18 inches thick and upon further investigation rested upon another section of concrete slab. The debris field and concrete were subsequently removed and disposed later on in the project.

**2.2.4 Excavation.** Impacted soil removal began with the excavation of the three isolated areas located northeast and south of Building 1606 (Zones 1 and 3) and the area adjacent to Avenue A North (Zone 2). Soil was excavated to a depth of approximately 28 inches from land surface in each area. Groundwater was not encountered during the excavation of soil.

In Zone 4, based on data collected in 1998, a 7,059 square foot area was excavated to approximately 51 inches from land surface. Creosote pilings were uncovered in the vertical position at approximately 36 inches from land surface. These pilings were left in place. The remaining area of Zone 4 was excavated to depths ranging from 24 to 38 inches from the land surface. Groundwater was not encountered while excavating soil to this depth.

Personnel operating earth-moving equipment encountered numerous creosote timbers and pilings while excavating soil from the Zone 5 area. The debris was removed and disposed accordingly. The area in this zone was excavated to a depth of approximately 28 inches from the land surface. In the process of excavating soil, equipment operators uncovered an abandoned catch basin located approximately 24 inches from the land surface. The catch basin had a resin type seal that was broken during the removal of soil. Inside the catch basin was an approximately 18-inch drain line. Representatives from the Caretaker Site Office (CSO) investigated the catch basin. The CSO determined the 18-inch line could be part of the existing storm drain system. Utility drawings for the Naval Complex, however, did not identify a catch basin or storm drain line existing in the area. Upon recommendations from the CSO, the catch basin vault was backfilled with rock and sealed with a concrete cap. Later in the project, the area was backfilled with soil and graded to existing conditions.

The area in Zone 6 was excavated to depths ranging from 24 to 27 inches from the land surface. Soil removed in this area was performed without incident.

Excavation of soil was not performed in the areas of Zone 7 and 8 based on the results of the 1998 investigation. Data collected in the field during the investigation revealed lead concentrations below residential levels; therefore, soil removal was not conducted in those zones.

Earth moving equipment was required to remove contaminated sources (soil and concrete) from land to inside haul truck trailers or roll-off containers. Haul trucks and containers supplied by Will's Trucking, Inc. transported the waste to Safety-Kleen (Pinewood), Inc., a facility permitted to accept hazardous wastes. See Volume II for copies of completed manifests.

**2.3 Plan Modification and Justification.** Modifications to the IM Work Plan were not required.

### **3. INTERIM MEASURE OUTCOME**

**3.1 SITE CONDITIONS FOLLOWING COMPLETION OF WORK.** Following completion of all site work, the DET had accomplished the removal of 8,320.44 tons of contaminated soil and concrete and approximately 1,366 tons of non-hazardous debris. Test results of the remaining soil confirmed that the conditions following the excavation met the objectives of paragraph 1.4 of this report. Site restoration included back-filling the excavations and grading the site to existing conditions with run-of-crush (ROC).

## **4. SAMPLING**

### **4.1 SAMPLING EVOLUTIONS AND RESULTS.**

**4.1.1 Investigative Sampling and Analysis.** Figure 2 in Appendix A depicts the locations and results of samples collected in 1998. All samples were transferred via a chain-of-custody form to a certified laboratory and tested for Total Lead with a total of nineteen of the samples being tested for TCLP Lead. All samples were collected using stainless steel equipment and transferred inside laboratory certified 8 oz. glass jars sealed with custody seals. See Volume III for copies of Certificates of Analyses for all sampling data.

**4.1.2 Confirmatory Soil Sampling and Analysis.** The purpose of the confirmatory samples was to investigate and confirm the conditions of the remaining soil vertically and the extents of the excavation horizontally. Eighty-five (85) soil samples collected in 1998 and reporting less than 400 ppm were used during the project to confirm the horizontal extents of the excavation boundaries. The eighty-five sample locations are shown in Figure 3 of Appendix A and are identified as 1998 soil samples. In addition to the 1998 samples, forty-one (41) grab samples were collected during the project from areas illustrated in Figure 3. The samples identified as 1999 confirmatory soil samples were collected to confirm that the conditions of the remaining soil vertically and horizontally met the cleanup goals for this IM.

The samples were collected in the first or second intervals depending on the area. Samples were homogenized in stainless steel bowls with stainless steel spoons and then placed inside laboratory certified 4-oz glass jars sealed with custody seals. After the confirmatory samples were collected, a Chain of Custody Record was completed and the samples transferred to a certified laboratory for analysis of Total Lead. Sample collection and analyses were executed as directed per Reference (d) of the IM Work Plan. See Volume III for copies of Certificates of Analyses for sampling data and Table 1 below for sample results.

**Table 1**  
**Confirmation Sample Results (mg/kg)**

<b>Sample No.</b>	<b>Result</b>	<b>Sample No.</b>	<b>Result</b>	<b>Sample No.</b>	<b>Results</b>
Sport0215-3	<b>128.0</b>	Sport0228-9	<b>3.270</b>	Sport0233-3	<b>8.450</b>
Sport0215-4	<b>257.0</b>	Sport0228-10	<b>11.60</b>	Sport0233-4	<b>13.10</b>
Sport0224-1	<b>71.40</b>	Sport0228-11	<b>9.770</b>	Sport0233-5	<b>4.050</b>
Sport0226-1	<b>29.20</b>	Sport0229-1	<b>8.670</b>	Sport0233-6	<b>4.100</b>
Sport0226-2	<b>16.60</b>	Sport0229-2	<b>3.680</b>	Sport0233-7	<b>2.940</b>
Sport0226-3	<b>8.150</b>	Sport0229-3	<b>18.20</b>	Sport0233-8	<b>3.400</b>
Sport0228-1	<b>3.740</b>	Sport0232-1	<b>94.20</b>	Sport0233-9	<b>8.450</b>
Sport0228-2	<b>6.570</b>	Sport0232-2	<b>2.550</b>	Sport0234-1	<b>1.200</b>
Sport0228-3	<b>6.640</b>	Sport0232-3	<b>5.990</b>	Sport0236-1	<b>3.140</b>
Sport0228-4	<b>7.470</b>	Sport0232-4	<b>2.730</b>	Sport0239-1	<b>2.240</b>
Sport0228-5	<b>565.0</b>	Sport0232-5	<b>2.920</b>	Sport0239-2	<b>1.810</b>
Sport0228-6	<b>6.070</b>	Sport0232-6	<b>3.400</b>	Sport0239-3	<b>2.130</b>
Sport0228-7	<b>4.020</b>	Sport0233-1	<b>105.0</b>		
Sport0228-8	<b>6.750</b>	Sport0233-2	<b>33.30</b>		

**4.1.3. Waste Characterization Sampling and Analysis.** Soil samples collected in 1998 were analyzed for TCLP Lead. The analysis was conducted for waste characterization purposes in order to properly dispose the material. The samples were submitted to a certified laboratory via a completed Chain-of-Custody record. The analytical results of the samples indicated TCLP values ranging from 0.02 to 65.4 ppm (see Table 2 below). The average of the TCLP values exceeded the toxicity characteristic for lead (D008) limit of 5.0 mg/L as cited in 40 CFR 261.24. As a result, the soil and a concrete characterized as waste code D008 would have to be treated before disposal into a Subtitle C landfill. Copies of "certificates of analysis" and "chain-of-custodies" are included in Volume III.

Prior to accepting the waste from SWMU 2, the Safety-Kleen (Pinewood) facility collected a composite sample load (18 CY roll-off container) to be analyzed by their facility. Based on the analysis of the composite load, Pinewood determined how to treat the waste to meet land disposal restrictions before placement into a landfill.

**Table 2**  
**Soil TCLP Data (mg/L)**

<b>Sample No.</b>	<b>Result (ppm)</b>	<b>Zone</b>	<b>Sample No.</b>	<b>Result (ppm)</b>	<b>Zone</b>
Sport0608-29	<b>8.4</b>	3	<b>Sport0636-23</b>	10.2	<b>4</b>
Sport0630-07	<b>0.2086</b>	5	<b>Sport0639-13</b>	6.70	<b>4</b>
Sport0630-25	<b>51.6</b>	5	<b>Sport0667-01</b>	0.0282	<b>Btwn 5 &amp; 3</b>
Sport0632-25	<b>65.4</b>	6	<b>Sport0667-03</b>	25.9	<b>Btwn 5 &amp; 4</b>
Sport0667-07	<b>24.0</b>	Btwn 6 & 4	<b>Sport0667-19</b>	4.86	<b>6</b>

Historically, a section of concrete slab was used to store batteries. Based on this information corings were collected and analyzed for TCLP Lead from select areas of asphalt and concrete slabs targeted for removal. Each coring was crushed and homogenized before placement in a laboratory certified glass jar. A total of seven (7) samples were collected with one sample exceeding the TCLP value for Lead toxicity. Sample Sport0145-1 reported a TCLP value of 19.1 mg/L for a concrete coring collected in the vicinity of battery storage. Based on this result, an approximately 6,081 SF area of concrete was characterized as hazardous (waste code D008). The concrete was microencapsulated and disposed at the Pinewood facility. See TCLP values below in Table 3 for all concrete and asphalt samples. "Certificates of analysis" are in Volume III.

**Table 3**  
**Concrete TCLP Data (mg/L)**

<b>Sample No.</b>	<b>Result</b>	<b>Material</b>	<b>Sample No.</b>	<b>Result</b>	<b>Material</b>
Sport0145-1	<b>19.1</b>	Concrete	<b>Sport0165-1</b>	0.352	<b>Asphalt</b>
Sport0165-2	<b>0.234</b>	Asphalt	<b>Sport0165-3</b>	0.0391	<b>Concrete</b>
Sport0165-4	<b>0.0175</b>	Concrete	<b>Sport0165-5</b>	0.279	<b>Asphalt</b>
Sport0165-6	<b>ND</b>	Concrete			

ND=No Detection of analyte

## **5. WASTE GENERATION**

### **5.1 NON-HAZARDOUS WASTE.**

**5.1.1 Debris.** Approximately 1,366 tons of non-hazardous debris, such as concrete, asphalt, and creosote timbers, were disposed inside 20 or 40 CY roll-off containers and transported by Fennell Container, Co. to Oakridge-Chambers Landfill. Oakridge-Chambers is a licensed Subtitle D landfill permitted to handle special wastes. Copies of completed manifests are located in Volume II.

### **5.2 HAZARDOUS WASTE.**

**5.2.1 Soil and Concrete.** Will's Trucking, Inc. transported approximately 8320.44 tons of soil and concrete characterized as hazardous (via haul trucks and roll-offs) from the site to Safety-Kleen (Pinewood), Inc. located in Pinewood, South Carolina. Upon arrival at the Pinewood facility, the waste was treated for placement in the facilities landfill. Copies of completed manifests are located in Volume II.

# **APPENDIX A**

## **FIGURES**

**SWMU 2  
BOUNDARY**

NAVAL COMPLEX BOUNDARY LINE

CODPER RIVER

NOISSETTE CREEK

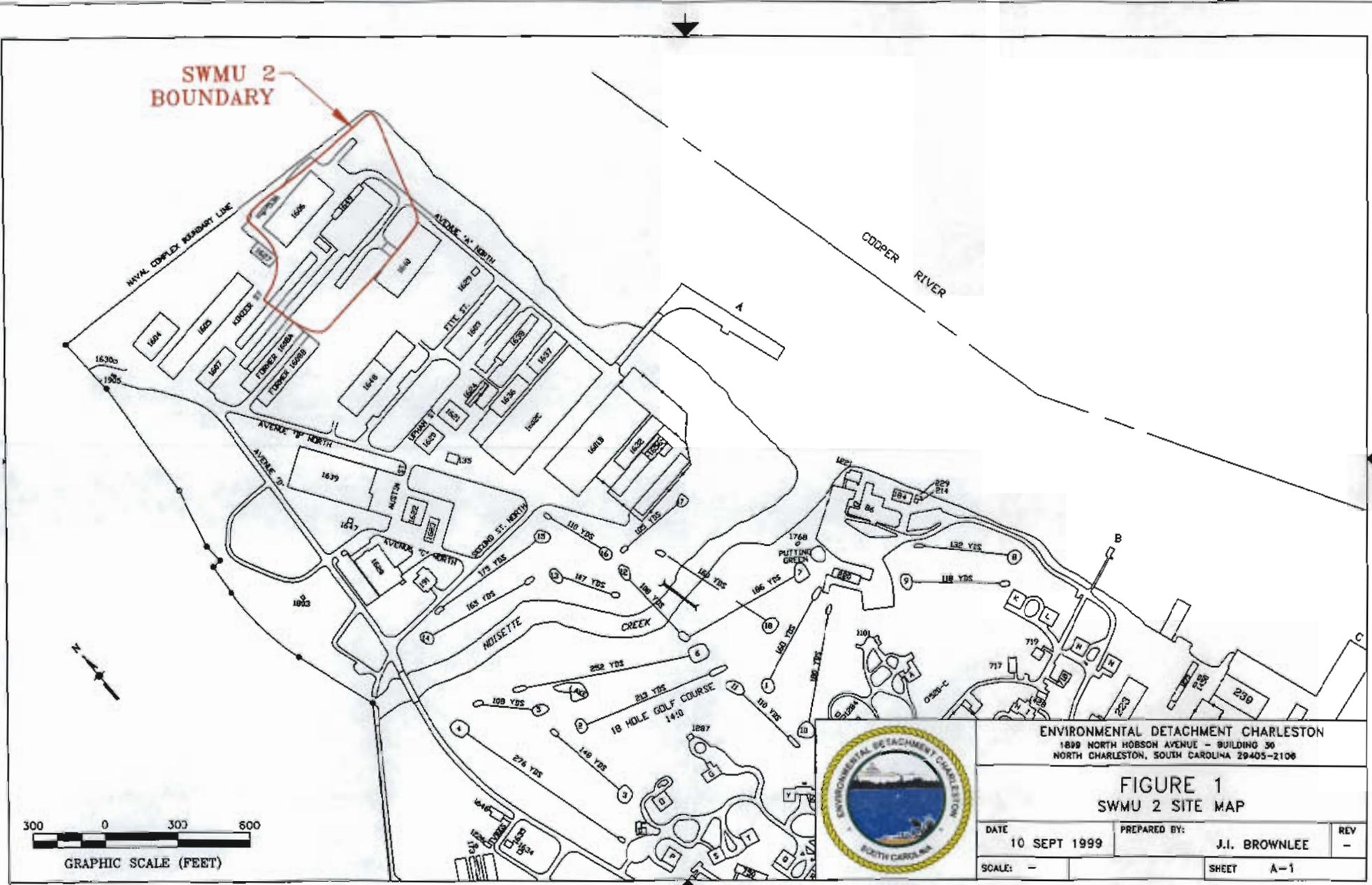
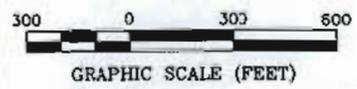
18 HOLE GOLF COURSE  
1410

ENVIRONMENTAL DETACHMENT CHARLESTON  
1899 NORTH HOBSON AVENUE - BUILDING 30  
NORTH CHARLESTON, SOUTH CAROLINA 29403-2106

**FIGURE 1  
SWMU 2 SITE MAP**



DATE	10 SEPT 1999	PREPARED BY:	J.I. BROWNLEE	REV	-
SCALE:	-	SHEET	A-1		



# **APPENDIX B**

## **PICTURES**



SWMU 2 Area Before Interim Measure. View from Atop Building 1640



East End View of 6<sup>th</sup> Street North before Interim Measures



View of Zone 1 before Interim Measures



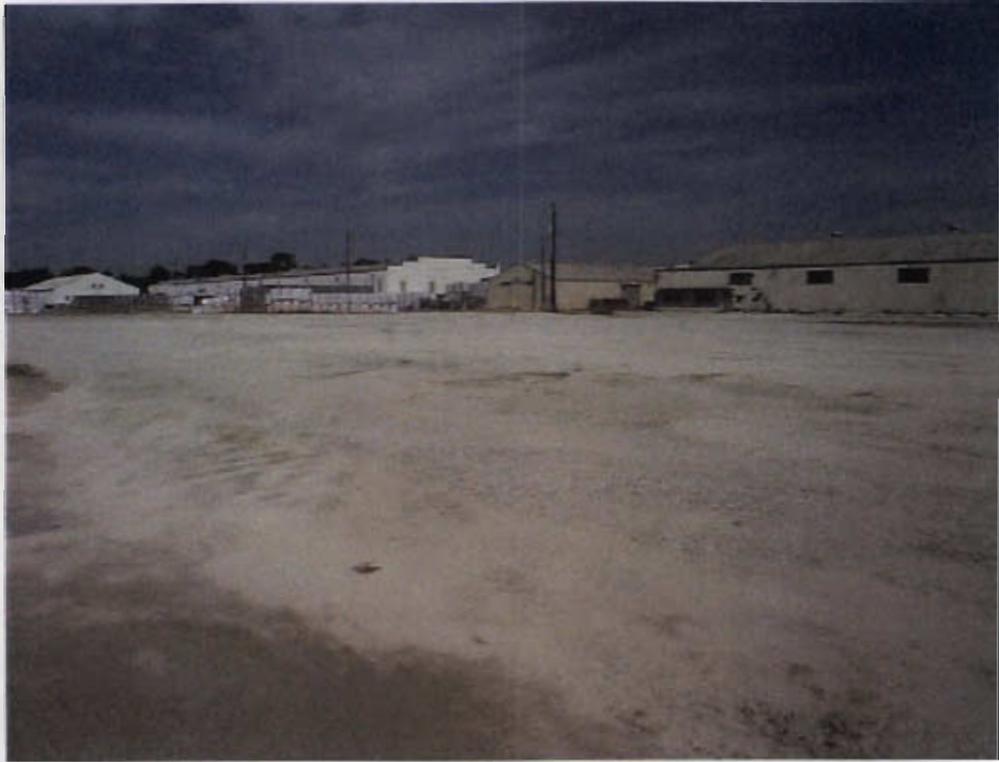
East End View of 6<sup>th</sup> St. North-Asphalt Removed



Excavating soil-View Looking South



Excavating Soil-View Looking East



SWMU 2 After Completion of Interim Measures



View of Zone 3 Following Completion of Interim Measures