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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT
ADDENDUM SOLID WASTE MANAGEMENT UNIT 53 (SWMU 53) AND AREA OF CONCERN
526 (AOC 526) ZONE E CNC CHARLESTON SC
9/19/2002
CH2M HILL

RFI REPORT ADDENDUM

SWMU 53 and AOC 526, Zone E



***Charleston Naval Complex
North Charleston, South Carolina***

SUBMITTED TO
***U.S. Navy Southern Division
Naval Facilities Engineering Command***

CH2M-Jones

September 2002

Contract N62467-99-C-0960



CH2MHILL

CH2M HILL

3011 S.W. Williston Road

Gainesville, FL

32608-3928

Mailing address:

P.O. Box 147009

Gainesville, FL

32614-7009

Tel 352.335.7991

Fax 352.335.2959

September 19, 2002

Mr. David Scaturo
South Carolina Department of Health and
Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum (Revision 0) – SWMU 53 and AOC 526, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum (Revision 0) for SWMU 53 and AOC 526 in Zone E of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Sam Naik. Please do not hesitate to contact him at 770/604-9182, extension 255, should you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Rob Harrell/Navy, w/att
Gary Foster/CH2M HILL, w/att

RFI REPORT ADDENDUM

SWMU 53 and AOC 526, Zone E



***Charleston Naval Complex
North Charleston, South Carolina***

SUBMITTED TO
***U.S. Navy Southern Division
Naval Facilities Engineering Command***

PREPARED BY
CH2M-Jones

September 2002

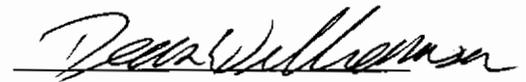
*Revision 0
Contract N62467-99-C-0960
158814.ZE.PR.18*

**Certification Page for RFI Report Addendum (Revision 0) –
SWMU 53 and AOC 526, Zone E**

I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.

9/13/2002
Date

1 Contents

2 Section	Page
3 Acronyms and Abbreviations	vi
4 1.0 Introduction.....	1-1
5 1.1 Background.....	1-1
6 1.2 Purpose of the RFI Report Addendum.....	1-2
7 1.3 Report Organization.....	1-3
8 Figure 1-1 Location of SWMU 53 and AOC 526 in Zone E	1-4
9 Figure 1-2 Aerial Photograph of SWMU 53 and AOC 526.....	1-5
10 2.0 Summary of RFI Conclusions for SWMU 53 and AOC 526.....	2-1
11 2.1 Soil Sampling and Analysis	2-1
12 2.1.1 Surface Soil Results.....	2-1
13 2.1.2 Subsurface Soil Results	2-2
14 2.2 Groundwater Sampling and Analysis.....	2-3
15 2.2.1 Shallow Groundwater Results.....	2-3
16 2.2.2 Deep Groundwater Results.....	2-3
17 2.3 RFI Human Health Risk Assessment (HHRA)	2-4
18 2.3.1 Soils.....	2-4
19 2.3.2 Groundwater	2-4
20 2.4 RFI Conclusions and Recommendations	2-4
21 Figure 2-1 RFI Sampling Locations.....	2-5
22 3.0 Interim Measures and UST/AST Removals.....	3-1
23 3.1 UST/AST Removals.....	3-1
24 3.2 Interim Measures.....	3-1
25 4.0 Summary of Additional Investigations	4-1
26 5.0 COPC/COC Refinement.....	5-1
27 5.1 Surface Soil	5-1
28 5.1.1 BEQs	5-1
29 5.1.2 Mercury.....	5-2
30 Table 5-1 Detected Concentrations of VOCs Acetone and Carbon Disulfide in Soil.....	5-3
31 Table 5-2 Surface Soil COPCs.....	5-4
32 6.0 Summary of Information Related to Site Closeout Issues.....	6-1
33 6.1 RFI Status	6-1

1 Contents, Continued

2	6.2	Presence of Inorganics in Groundwater	6-1
3	6.3	Potential Linkage to SWMU 37, Investigated Sanitary Sewers at	
4		the CNC	6-1
5	6.4	Potential Linkage to AOC 699, Investigated Storm Sewers at the CNC	6-2
6	6.5	Potential Linkage to AOC 504, Investigated Railroad Lines at the CNC	6-2
7	6.6	Potential Migration Pathways to Surface Water Bodies at the CNC	6-2
8	6.7	Potential Contamination in Oil/Water Separators (OWSs)	6-2
9	6.8	Land Use Controls (LUCs).....	6-2
10	7.0	Recommendations	7-1
11	8.0	References	8-1
12			
13		Appendices	
14	A	Excerpts from the <i>Zone E RFI Report, Revision 0</i> (EnSafe, 1997) and Figure A-1,	
15		<i>Shallow Groundwater Contours</i>	
16	B	Historic Railroad Location Map	

1 Acronyms and Abbreviations

2	AOC	Area of concern
3	AST	Aboveground storage tank
4	BCT	BRAC Cleanup Team
5	BEQ	Benzo[a]pyrene equivalent
6	BRAC	Base Realignment and Closure Act
7	BRC	Background reference concentration
8	CA	Corrective action
9	CNC	Charleston Naval Complex
10	CNSY	Charleston Naval Ship Yard
11	COC	Chemical of concern
12	COPC	Chemical of potential concern
13	DAF	Dilution attenuation factor
14	EnSafe	EnSafe Inc.
15	EPA	U.S. Environmental Protection Agency
16	FRE	Fixed-point risk evaluation
17	HHRA	Human health risk assessment
18	IM	Interim measure
19	HI	Hazard index
20	LUC	Land use control
21	MCL	Maximum contaminant level
22	µg/kg	Microgram per kilogram
23	µg/L	Microgram per liter
24	mg/kg	Milligram per kilogram
25	mg/L	Milligram per liter
26	NAVBASE	Naval Base
27	NFA	No further action
28	NFI	No further investigation
29	OWS	Oil/water separator
30	PCB	Polychlorinated biphenyl

1 **Acronyms and Abbreviations, Continued**

2	RBC	Risk-based concentration
3	RCRA	Resource Conservation and Recovery Act
4	RFI	RCRA Facility Investigation
5	SAA	Satellite Accumulation Area
6	SCDHEC	South Carolina Department of Health and Environmental Control
7	SSL	Soil screening level
8	SVOC	Semivolatile organic compound
9	SWMU	Solid waste management unit
10	TDS	Total dissolved solids
11	UCL ₉₅	95-percent upper confidence level
12	UST	Underground storage tank
13	VOC	Volatile organic compound

Section 1.0

1.0 Introduction

2 In 1993, Naval Base (NAVBASE) Charleston was added to the list of bases scheduled for
3 closure as part of the Defense Base Realignment and Closure Act (BRAC), which regulates
4 closure and transition of property to the community. The Charleston Naval Complex (CNC)
5 was formed as a result of the dis-establishment of the Charleston Naval Shipyard and
6 NAVBASE on April 1, 1996.

7 Corrective Action (CA) activities are being conducted under the Resource Conservation and
8 Recovery Act (RCRA) with the South Carolina Department of Health and Environmental
9 Control (SCDHEC) as the lead agency for CA activities at the CNC. All RCRA CA activities
10 are performed in accordance with the Final RCRA Part B Permit (Permit No. SC0 170
11 022 560).

12 In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation
13 and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to
14 complete the RCRA Facility Investigation (RFI) for Solid Waste Management Unit (SWMU)
15 53 and Area of Concern (AOC) 526 in Zone E of the CNC. The locations of SWMU 53 and
16 AOC 526 in Zone E are shown in Figure 1-1. Figure 1-2 shows an aerial photograph of
17 SWMU 53 and AOC 526.

1.1 Background

19 SWMU 53 and AOC 526 consist of two related areas in Building 212 and were therefore
20 investigated together during the RFI. Building 212 is located between Shipbuilding Way
21 and Everglades Drive in Zone E of the CNC. Railroad lines are located approximately 100
22 feet west of the building.

23 SWMU 53 consists of the former Satellite Accumulation Area (SAA) 29, which was used as
24 part of the Charleston Naval Ship Yard (CNSY) hazardous waste management system.
25 SAA 29 was used to temporarily store accumulated waste material in 55-gallon drums prior
26 to disposal. The SAA was located outside Building 212 on asphalt surface. Waste material
27 included acids, bases, metals, solvents, petroleum hydrocarbons and paints. Use of SAA 29
28 has been discontinued since base closure.

1 AOC 526 consists of an area that was used for sand blasting and spray painting ship
2 components. Two types of metal-based paints were used in the spray painting process.
3 AOC 526 was used between 1974 and 1993. The unit is located on an asphalt pavement.

4 SWMU 53 and AOC 526 have been cleaned and all accumulated waste material from SAA
5 29 had been removed at the time of the RFI. Building 212 is currently being used as an
6 abrasive sand blasting booth operated by Metal Trades, Inc.

7 Materials of concern identified based on historical operations for SWMU 53 and AOC 526 in
8 the *Final Zone E RFI Work Plan, Revision 1* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1995)
9 include acids, metals, solvents, petroleum hydrocarbons and paints. This area of Zone E is
10 zoned M-2 (industrial). The CNC RCRA Permit identified SWMU 53 and AOC 526 as
11 requiring a RFI.

12 The RFI was initially conducted by the Navy/EnSafe Inc. (EnSafe) team, and the *Zone E RFI*
13 *Report, Revision 0* (EnSafe, 1997) was prepared and submitted during 1997. Regulatory
14 review was conducted on this document and draft responses to the comments from
15 SCDHEC were prepared by the Navy/EnSafe team.

16 **1.2 Purpose of the RFI Report Addendum**

17 The purpose of this RFI Report Addendum is to document the results of the previous RFI
18 investigation conducted by the Navy/EnSafe team at SWMU 53 and AOC 526. This RFI
19 Report Addendum also discusses the findings of previous investigations, existing site
20 conditions, and surrounding area land use.

21 Prior to changing the status of any site in the CNC RCRA CA permit, the BRAC Cleanup
22 Team (BCT) agreed that the following issues should be considered:

- 23 • Status of the RFI
- 24 • Presence of metals (inorganics) in groundwater
- 25 • Potential linkage to SWMU 37, Investigated Sanitary Sewers at the CNC
- 26 • Potential linkage to AOC 699, Investigated Storm Sewers at the CNC
- 27 • Potential linkage of AOC 504, Investigated Railroad Lines at the CNC
- 28 • Potential linkage to surface water bodies (Zone J)
- 29 • Potential contamination associated with oil/water separators (OWSs)
- 30 • Relevance or need for land use controls (LUCs) at the site

1 Information regarding these issues is provided in this RFI Report Addendum to expedite
2 evaluation of closure of the site.

3 **1.3 Report Organization**

4 This RFI Report Addendum consists of the following sections, including this introductory
5 section:

6 **1.0 Introduction** – Presents the purpose of the report and background information relating
7 to the RFI Report Addendum.

8 **2.0 Summary of RFI Conclusions for SWMU 53 and AOC 526** – Summarizes the
9 conclusions from the RFI investigation and risk evaluation for SWMU 53 and AOC 526
10 as presented in *the Zone E RFI Report, Revision 0*.

11 **3.0 Interim Measures and UST/AST Removals** – Provides information regarding any
12 interim measures (IMs) or tank removal activities performed at the site.

13 **4.0 Summary of Additional Investigations** – Summarizes information, if any, collected
14 after completion of the *Zone E RFI Report, Revision 0*.

15 **5.0 COPC/COC Refinement** – Provides further evaluation of chemicals of potential concern
16 (COPCs) based on the RFI and additional data used to assess them as chemicals of
17 concern (COCs).

18 **6.0 Summary of Information Related to Site Closeout Issues** – Discusses the various site
19 closeout issues that the BCT agreed to evaluate prior to site closeout.

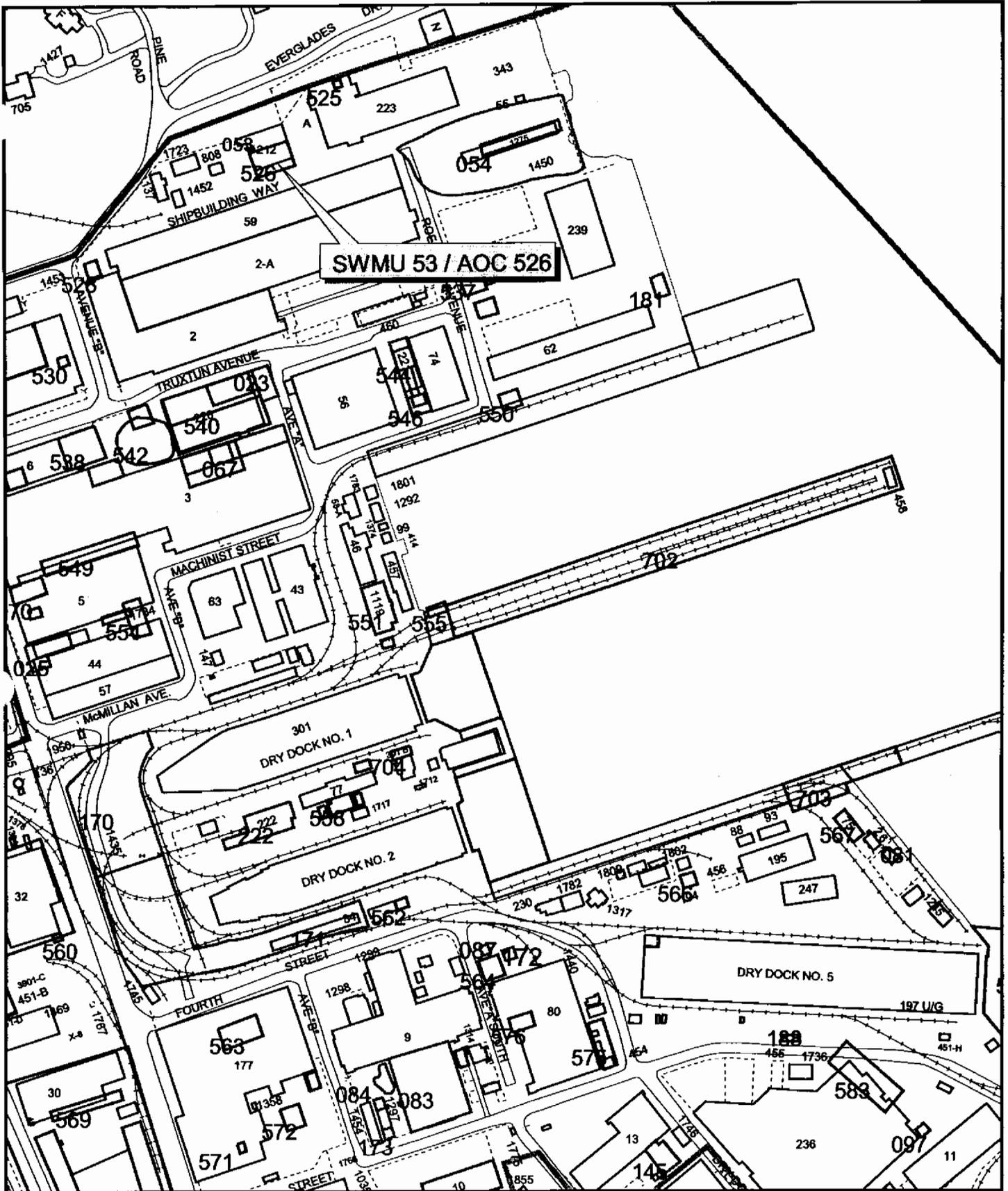
20 **7.0 Recommendations** – Provides recommendations for No Further Action (NFA) at
21 SWMU 53 and AOC 526.

22 **8.0 References** – Lists the references used in this document.

23 **Appendix A** – Contains excerpts from the *Zone E RFI Report, Revision 0*, including a
24 summary of detections of chemicals and a groundwater flow map for the site vicinity.

25 **Appendix B** – Contains a historic railroad location map, with the SWMU 53 and AOC 526
26 site identified.

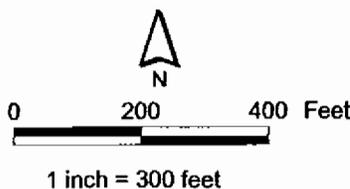
27 All figures and tables appear at the end of their respective sections.



SWMU 53 / AOC 526

Figure 1-1
 Location of SWMU 53 / AOC 526 in Zone E
 Charleston Naval Complex

- Fence
- Railroads
- Roads
- Shoreline
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary



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- Fence
- Railroads
- Roads - Lines
- AOC Boundary
- SWMU Boundary
- Buildings

Zone Boundary

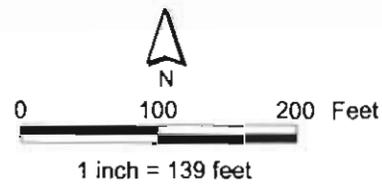


Figure 1.2
Site Map
SWMU 53 and AOC 526, Zone E
Charleston Naval Complex

2.0 Summary of RFI Conclusions for SWMU 53 and AOC 526

This section summarizes the results and conclusions from the RFI conducted at SWMU 53 and AOC 526 as reported in the *Zone E RFI Report, Revision 0* (EnSafe, 1997). Figure 2-1 shows soil and groundwater sampling locations. Appendix A contains excerpts from the RFI report, including a summary of detections of chemicals and a groundwater flow map for the site vicinity.

As part of the RFI, soil and groundwater investigations were conducted at SWMU 53 and AOC 526 during 1995-1997. The RFI report presented the results of these investigations and conclusions concerning contamination and risk, as summarized in the following sections. A further evaluation of COCs at SWMU 53 and AOC 526 is provided in Section 5.0.

2.1 Soil Sampling and Analysis

The RFI soil investigation at SWMU 53 and AOC 526 consisted of two sampling events. Figure 2-1 shows the RFI sample locations at SWMU 53 and AOC 526.

During the first sampling event, surface and subsurface soil samples were collected from sampling locations E053SB001, E053SB002, and E526SB002 through E526SB009. Soil samples were analyzed for organotins, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals and cyanide. Three duplicate soil samples were collected and analyzed for an extended list of analytes, including organotins, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, hexavalent chromium, herbicides, and dioxins.

During the second sampling event, surface and subsurface soil samples were collected from sampling locations E053SB003 and E053SB004. Soil samples were analyzed for organotins, VOCs, SVOCs, pesticides, PCBs, metals and cyanide. Two duplicate soil samples were collected and analyzed for an extended list of analytes, including organotins, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, hexavalent chromium, herbicides, and dioxins.

2.1.1 Surface Soil Results

During the RFI, surface soil detections of organic compounds were evaluated against the U.S. Environmental Protection Agency (EPA) Region III industrial RBCs (with a hazard

1 index [HI]=0.1 for noncarcinogens). Surface soil detections of inorganic compounds were
2 evaluated against the EPA Region III industrial RBCs (HI=0.1 for noncarcinogens) and the
3 Zone E background reference concentrations (BRCs).

4 Detected concentrations of organic and inorganic compounds for surface soil samples were
5 as follows:

- 6 • **Organotins:** Organotins were not detected in surface soil above screening criteria.
- 7 • **VOCs:** No VOCs were detected in surface soil above screening criteria.
- 8 • **SVOCs:** Benzo[a]pyrene equivalents (BEQs) were detected in surface soil sample
9 E526SB002 at a concentration of 2.32 milligrams per kilogram (mg/kg) above the
10 industrial RBC for benzo[a]pyrene of 0.780 mg/kg.
- 11 • **Pesticides:** No pesticides were detected in surface soil above screening criteria.
- 12 • **PCBs:** No PCBs were detected in surface soil above screening criteria.
- 13 • **Inorganics:** No inorganics were detected in surface soil above screening criteria.
- 14 • **Cyanide:** No cyanide was detected in surface soil above laboratory detection limits.
- 15 • **Herbicides:** No herbicides were detected in surface soil above laboratory detection limits.
- 16 • **Dioxins:** No dioxins were detected in surface soil above the screening criteria.

17 2.1.2 Subsurface Soil Results

18 During the RFI, subsurface soil detections of organic compounds were compared with
19 generic soil screening levels (SSLs) (using a dilution attenuation factor [DAF]=10).

20 Subsurface soil detections of inorganic compounds were compared with generic SSLs (using
21 a DAF=10) and the Zone E BRCs.

22 Detected concentrations of organic and inorganic compounds from subsurface soil samples
23 are as follows:

- 24 • **Organotins:** No organotins were detected in subsurface soil above laboratory detection
25 limits.
- 26 • **VOCs:** No VOCs were detected in subsurface soil above screening criteria.
- 27 • **SVOCs:** BEQs were detected in the subsurface soil sample E053SB002 at a concentration
28 of 10.6 mg/kg.
- 29 • **Pesticides:** No pesticides were detected in subsurface soil above screening criteria.
- 30 • **PCBs:** No PCBs were detected in subsurface soil above laboratory detection limits.
- 31 • **Inorganics:** No inorganics were detected in subsurface soil above screening criteria.
- 32 • **Cyanide:** No cyanide was detected in subsurface soil above laboratory detection limits.
- 33 • **Herbicides:** No herbicides were detected above laboratory detection limits.

- 1 • **Dioxins:** No dioxins were detected above laboratory detection limits

2 **2.2 Groundwater Sampling and Analysis**

3 Groundwater was sampled during four sampling events at SWMU 53 and AOC 526. The
4 *Zone E RFI Report, Revision 0* presented groundwater data from the first sampling event.
5 Groundwater samples were collected from shallow monitoring wells E053GW001,
6 E526GW001 and E526GW002, and deep monitoring well E526GW01D. Groundwater
7 monitoring well locations are shown in Figure 2-1. Groundwater samples were analyzed for
8 organotins, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, chlorides, sulfates, and total
9 dissolved solids (TDS).

10 **2.2.1 Shallow Groundwater Results**

11 During the RFI, detections in shallow groundwater samples were compared to the EPA
12 Region III tap-water RBCs, maximum contaminant levels (MCLs), and the Zone E BRCs for
13 shallow groundwater.

14 Detected concentrations of organic and inorganic compounds for shallow groundwater
15 samples were as follows:

- 16 • **Organotins:** No organotins were detected above laboratory detection limits.
17 • **VOCs:** No VOCs were detected above screening criteria.
18 • **SVOCs:** No SVOCs were detected above laboratory detection limits.
19 • **Pesticides:** No pesticides were detected above laboratory detection limits.
20 • **PCBs:** No PCBs were detected above laboratory detection limits.
21 • **Inorganics:** Iron was detected in samples E053GW001, E526GW001 and E526GW002 at
22 concentrations of 9.65 milligrams per liter (mg/L), 1.18 mg/L, and 6.09 mg/L,
23 respectively above the USEPA Region III tap-water RBC for iron of 1.1 mg/L. No
24 primary MCL exists for iron, and no shallow groundwater BRC has been established for
25 iron in Zone E.
26 • **Cyanide:** No cyanide was detected above laboratory detection limits.

27 **2.2.2 Deep Groundwater Results**

28 During the RFI, detections in deep groundwater samples were compared to the USEPA
29 Region III tap-water RBCs, MCLs, and the Zone E BRCs for deep groundwater.

30 Detected concentrations of organic and inorganic compounds for deep groundwater
31 samples were as follows:

- 1 • **Organotins:** No organotins were detected above laboratory detection limits. -
- 2 • **VOCs:** No VOCs were detected above laboratory detection limits.
- 3 • **SVOCs:** No SVOCs were detected above laboratory detection limits.
- 4 • **Pesticides:** No pesticides were detected above laboratory detection limits.
- 5 • **PCBs:** No PCBs were detected above laboratory detection limits.
- 6 • **Inorganics:** No inorganics were detected above screening criteria.
- 7 • **Cyanide:** No cyanide was detected above laboratory detection limits.

8 **2.3 RFI Human Health Risk Assessment (HHRA)**

9 The *Zone E RFI Report Revision 0* used a fixed-point risk evaluation (FRE) approach at
10 SWMU 53 and AOC 526. The FRE considered site resident and site worker scenarios during
11 the FRE. The detailed risk assessment for the SWMU 53 and AOC 526 site is presented in
12 Section 10.5.6 of the *Zone E RFI Report, Revision 0*.

13 **2.3.1 Soils**

14 The HHRA for SMWU 53 and AOC 526 did not identify any COCs for surface soil or
15 subsurface soil.

16 **2.3.2 Groundwater**

17 The HHRA for SWMU 53 and AOC 526 did not identify any COCs for shallow or deep
18 groundwater.

19 **2.4 RFI Conclusions and Recommendations**

20 The *Zone E RFI Report, Revision 0* concluded that No Further Action (NFA) was needed at
21 SWMU 53 and AOC 526.

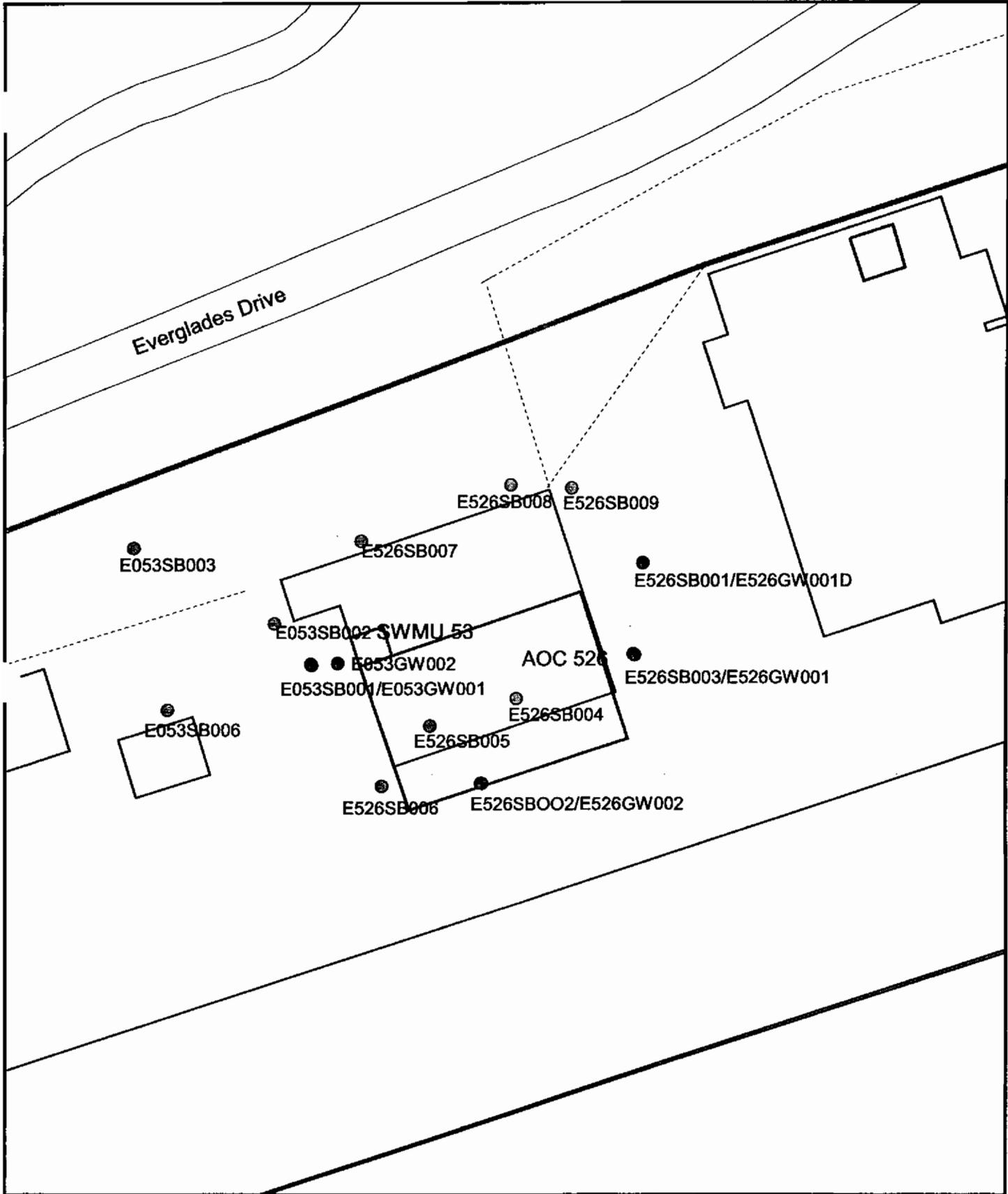
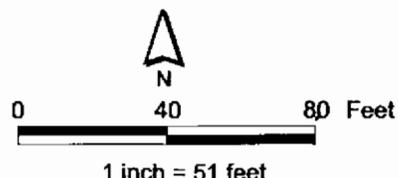


Figure 2-1
RFI Sampling Locations
SWMU 53 and AOC 526, Zone E
Charleston Naval Complex

- Groundwater Sampling Location
- ⊙ Soil Sampling Locations
- - - Fence
- ⚡ Railroads
- Roads - Lines
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary



1 **3.0 Interim Measures and UST/AST Removals**

2 **3.1 UST/AST Removals**

3 There is no indication that underground storage tanks (USTs) or aboveground storage tanks
4 (ASTs) were located at SWMU 53 and AOC 526.

5 **3.2 Interim Measures**

6 There were no IMs conducted at SWMU 53 and AOC 526.

1 **4.0 Summary of Additional Investigations**

- 2 No additional investigations have been conducted at SWMU 53 and AOC 526 since the RFI
3 was completed by the Navy/EnSafe team during 1995-1997.

1 5.0 COPC/COC Refinement

2 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) did not identify any COCs for SWMU 53
3 and AOC 526 for the future industrial land use scenario. Therefore, this site is suitable
4 immediately for continued industrial land use with LUCs to prevent residential land use.

5 During review of the data, CH2M Jones noted a few exceedances of chemicals above the
6 EPA Region III residential RBC screening criteria; these exceedances are discussed below to
7 expedite site closeout.

8 In addition, the BCT has agreed to rescreen VOC detections concentrations in soil against
9 generic SSLs based on a DAF of 1. Two VOCs, acetone and carbon disulfide, were detected
10 in soil samples from the site. Table 5-1 shows their detected concentrations. These VOC
11 detections did not exceed their respective SSLs with a DAF=1. Therefore, no further
12 screening for VOCs in soil is necessary.

13 5.1 Surface Soil

14 5.1.1 BEQs

15 BEQs were not identified as a surface soil COC in the RFI report for industrial land use. A
16 single BEQ exceedance of the sitewide reference concentration (1,304 micrograms per
17 kilogram [$\mu\text{g}/\text{kg}$]) in surface soil was noted in sample E526SB002. At this location, BEQs
18 were detected in surface soil at 2,218 $\mu\text{g}/\text{kg}$ above the residential RBC for benzo[a]pyrene of
19 0.087 mg/kg. BEQs were not detected in the subsurface soil sample above the CNC
20 subsurface soil BEQ site-wide reference concentration of 1.40 mg/kg at this location.

21 A 95-percent Upper Confidence Level (UCL_{95}) estimate of 830 $\mu\text{g}/\text{kg}$ was calculated for
22 surface soil BEQs at the site (by the non-parametric Bootstrap method) as shown in Table 5-
23 2. The UCL_{95} value is above the residential RBC of 0.087 mg/kg, and the industrial RBC of
24 0.78 mg/kg for benzo[a]pyrene, but below the CNC site-wide reference concentration of
25 1.304 mg/kg.

26 This site is located within Zone E in an area that is paved with asphalt material. The
27 elevated BEQ detections in the sample from E053SB002 could be a result of the BEQs
28 present in asphalt. As shown in Figure B-1, historic railroad lines are present on the south
29 and west side of the site, which could be contributing to the elevated BEQ detections in soil.
30 BEQ detections above the site-wide reference concentration were limited and the UCL_{95}

1 value for surface soil BEQs is below the CNC BEQ site-wide reference concentration. Based
2 on these observations, BEQs are not considered a COC for unrestricted (i.e., residential)
3 land use for this site.

4 **5.1.2 Mercury**

5 Mercury was not identified as a surface soil COC in the RFI report for the industrial land
6 use scenario. A single mercury exceedance in surface soil above the EPA Region III
7 residential RBC (HI=0.1) was noted at the surface soil sample from E053SB001 at a
8 concentration of 8.1 mg/kg. This value was also above the Zone E maximum surface soil
9 background mercury concentration of 2.7 mg/kg. The UCL_{95} (by the non-parametric
10 Bootstrap method) for surface soil mercury at the site was estimated to be 1.89 mg/kg (see
11 Table 5-2), which is lower than the residential RBC of 2.3 mg/kg (HI=0.1) and Zone E
12 maximum background mercury concentration of 2.7 mg/kg. This elevated mercury
13 detection was found in the soils under the asphalt pavement. Therefore, direct exposure to
14 these soils is limited. There were no exceedances of screening criteria for mercury in
15 subsurface soils at this site.

16 Because the UCL_{95} estimate for surface soil mercury is below the residential RBC with a
17 HI=0.1 which represents a conservative criterion, and is well below the residential RBC of
18 23 mg/kg with a HI=1.0, as well as the Zone E maximum mercury background
19 concentration of 2.7 mg/kg, mercury is not considered a COC for the unrestricted land use
20 scenario.

TABLE 5-1
 Detected Concentrations of VOCs Acetone and Carbon Disulfide in Soil
 RFI Report Addendum, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	SSL (DAF=1)	Zone E Background Range of Conc.
Acetone (Surface Soil)							
	E053SB002	E053SB00201	0.15	J	780	0.8	NA
	E526SB007	E526SB00702	0.12	J	780	0.8	NA
Carbon Disulfide (Subsurface Soil)							
	E053SB002	E053SB00202	0.005	J	780	2	NA

J Indicates an estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.

NA Not Applicable

TABLE 5-2
 Surface Soil COPCs
 RFI Report Addendum, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Concentration	Units	Qualifier	Date Collected	EPA Region III Residential RBC	SSL (DAF=1)	Zone E Background Range Concentration	
Mercury	(Surface Soil)									
		053SB003	053SB00301b	0.70000	mg/Kg	=	11/16/1995			
		053SB002	053SB00201	0.31000	mg/Kg	J	11/16/1995			
		053SB004	053SB00401	0.28000	mg/Kg	=	11/16/1995			
		526SB009	526SB00901	0.06000	mg/Kg	=	11/16/1995	2.3	1	0.03 - 2.7
		526SB008	526SB00801	0.10000	mg/Kg	J	11/16/1995			
		526SB007	526SB00701	0.10000	mg/Kg	J	11/16/1995			
		526SB004	526SB00401	0.09000	mg/Kg	J	11/16/1995			
		526SB005	526SB00501	0.22000	mg/Kg	J	11/16/1995			
		526SB003	526SB00301	0.11000	mg/Kg	=	11/16/1995			
		526SB002	526SB00201	0.19000	mg/Kg	J	11/16/1995			
		526SB006	526SB00601	0.30000	mg/Kg	J	11/16/1995			
			Site Average	0.88						
		Site UCL95% =	1.89						(Based on non-parametric - Bootstrap method)	
		Site UCL95% =	0.09						(Based on non-parametric method)	

Values are presented in units of micrograms per kilogram ($\mu\text{g}/\text{kg}$) or milligrams per kilogram (mg/kg).

- J Indicates an estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.
- = Indicates that the analyte was detected at the concentration shown.

TABLE 5-2
 Surface Soil COPCs
RFI Report Addendum, SWMU 53 and AOC 526, Zone E, Charleston Naval Complex

Parameter	Station ID	Sample ID	Concentration	Units	Qualifier	Date Collected	EPA Region III Residential RBC	SSL (DAF=1)	Zone E Background Range Concentration
U	Indicates that the analyte was not detected.								
UJ	Indicates that the analyte was not detected and the concentration is estimated.								
NA	Not applicable/not available.								

6.0 Summary of Information Related to Site Closeout Issues

6.1 RFI Status

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/AOCs within Zone E of the CNC, including SWMU 53 and AOC 526. The RFI did not identify any COCs for soil or groundwater at SWMU 53 and AOC 526. With the submission of this RFI Report Addendum, the RFI is considered complete.

The remaining subsections address the issues that the BCT agreed to evaluate prior to site closeout.

6.2 Presence of Inorganics in Groundwater

For the purpose of site closeout documentation, the inorganics in groundwater issue refers to the detection of several metals (primarily arsenic, thallium, and antimony) in groundwater at concentrations above the applicable MCL, preceded or followed by detections of these same metals below the MCL or below the practicable quantitation limit.

Arsenic was detected in shallow groundwater, but detections did not exceed its MCL. Antimony was not detected above laboratory detection limits. Thallium was only detected once above its MCL in the third sampling event, but was not detected above its laboratory detection limit during preceding and succeeding sampling events and was not detected above the maximum Zone E background thallium concentration in shallow groundwater of 26 micrograms per liter ($\mu\text{g}/\text{L}$). There are no data suggesting that there was an impact to ground water from site-related activities at SWMU 53 and AOC 526. Therefore, further evaluation of this issue is not warranted.

6.3 Potential Linkage to SWMU 37, Investigated Sanitary Sewers at the CNC

There are no data suggesting that there was an impact to the sanitary sewers from SWMU 53 and AOC 526. No COCs were identified at the site. Therefore, further evaluation of this issue is not warranted.

1 **6.4 Potential Linkage to AOC 699, Investigated Storm Sewers at**
2 **the CNC**

3 The site does not have any direct connection to the storm sewer system. Based on these
4 findings, further evaluation of this issue is not warranted.

5 **6.5 Potential Linkage to AOC 504, Investigated Railroad Lines**
6 **at the CNC**

7 The nearest railroad line to SWMU 53 and AOC 526 is approximately 100 feet to the
8 southeast of Building 212. There are no known connections between SWMU 53 and AOC
9 526 and the investigated railroad lines in Zone E at the CNC. Therefore, further evaluation
10 of this issue is not warranted.

11 **6.6 Potential Migration Pathways to Surface Water Bodies at**
12 **the CNC**

13 The nearest surface water body to SWMU 53 and AOC 526 is the Cooper River, which lies
14 approximately 120 feet east of the site. The only potential migration pathway from the site
15 to surface water is by overland flow from stormwater runoff. The entire site is covered with
16 buildings and pavement, which eliminates contact of surface soil with stormwater.
17 Similarly, runoff directed to the storm sewer system, which discharges to the Cooper River,
18 does not contact the surface soil. No COCs were identified at the site. Therefore, further
19 evaluation of potential migration of contaminated groundwater to a surface water body is
20 not warranted.

21 **6.7 Potential Contamination in Oil/Water Separators (OWSs)**

22 There are no OWSs associated with SWMU 53 and AOC 526. In addition, there is no
23 reference to an OWS at the site in the *Oil Water Separator Data* report, Department of the
24 Navy, September 2000. Therefore, further evaluation of this issue is not warranted.

25 **6.8 Land Use Controls (LUCs)**

26 No COCs have been identified at SWMU 53 and AOC 526. This evaluation was based on a
27 residential land use classification which is considered unrestricted use and is conservative.
28 Therefore, LUCs are not necessary.

- 1 However, the BCT has agreed that LUCs will be applied across all of Zone E at the CNC.
- 2 These LUCs are expected to include, at a minimum, restrictions for future land use to non-
- 3 residential use only. These LUCs will apply at SWMU 53 and AOC 526 due to its location
- 4 within Zone E.

1 **7.0 Recommendations**

2 SWMU 53 consists of the former SAA 29 which was used as part of the CNSY hazardous
3 waste management system. SAA 29 was used to temporarily store accumulated waste
4 material in 55-gallon drums prior to disposal. Waste material included acids, bases, metals,
5 solvents, petroleum hydrocarbons and paints. Use of SAA 29 has been discontinued since
6 base closure.

7 AOC 526 consists of an area that was used for sand blasting and spray painting ship
8 components. Two types of metal-based paints were used in the spray painting process.
9 AOC 526 was used between 1974 and 1993. SWMU 53 and AOC 526 have been cleaned and
10 all accumulated waste material from SAA 29 have been removed prior to the RFI.

11 The CNC RCRA Permit identified SWMU 53 and AOC 526 as requiring a RFI.

12 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified no COCs in surface and
13 subsurface soil at SWMU 53 and AOC 526, based on the industrial land use scenario and
14 recommended no corrective measures. Further evaluation of site constituents did not
15 identify any COCs for the unrestricted (i.e., residential) land use scenario at this site, and no
16 further corrective action is necessary. Therefore, this site is recommended for NFA. Because
17 the SWMU 53/AOC 526 site is within Zone E, LUCs that are applicable across Zone E will
18 also apply at this location.

19 Once the BCT concurs that NFA is appropriate for the site, a Statement of Basis will be
20 prepared that will be made available for public comment in accordance with SCDHEC
21 policy. This will allow for public participation in the final remedy selection.

1 **8.0 References**

- 2 EnSafe Inc. *Zone E RFI Report, Revision 0, NAVBASE Charleston.* 1997.
- 3 EnSafe Inc./Allen & Hoshall. *Final RCRA Facility Assessment, NAVBASE Charleston.* July
4 1995.
- 5 EnSafe Inc./Allen & Hoshall. *Final Zone E RFI Work Plan, Revision 1, NAVBASE Charleston.*
6 June 1995.
- 7 CH2M-Jones. *Technical Memorandum: A Summary of Inorganic Chemical Concentrations in*
8 *Background Soil and Groundwater at the CNC.* 2001.
- 9 South Carolina Department of Health and Environmental Control, Final RCRA Part B
10 Permit No. SC0 170 022 560.

Table 10.5.A
 Chemicals Present in Site Samples
 SWMU 53; AOC 526 - Surface Soil
 NAVBASE - Charleston
 Charleston, South Carolina

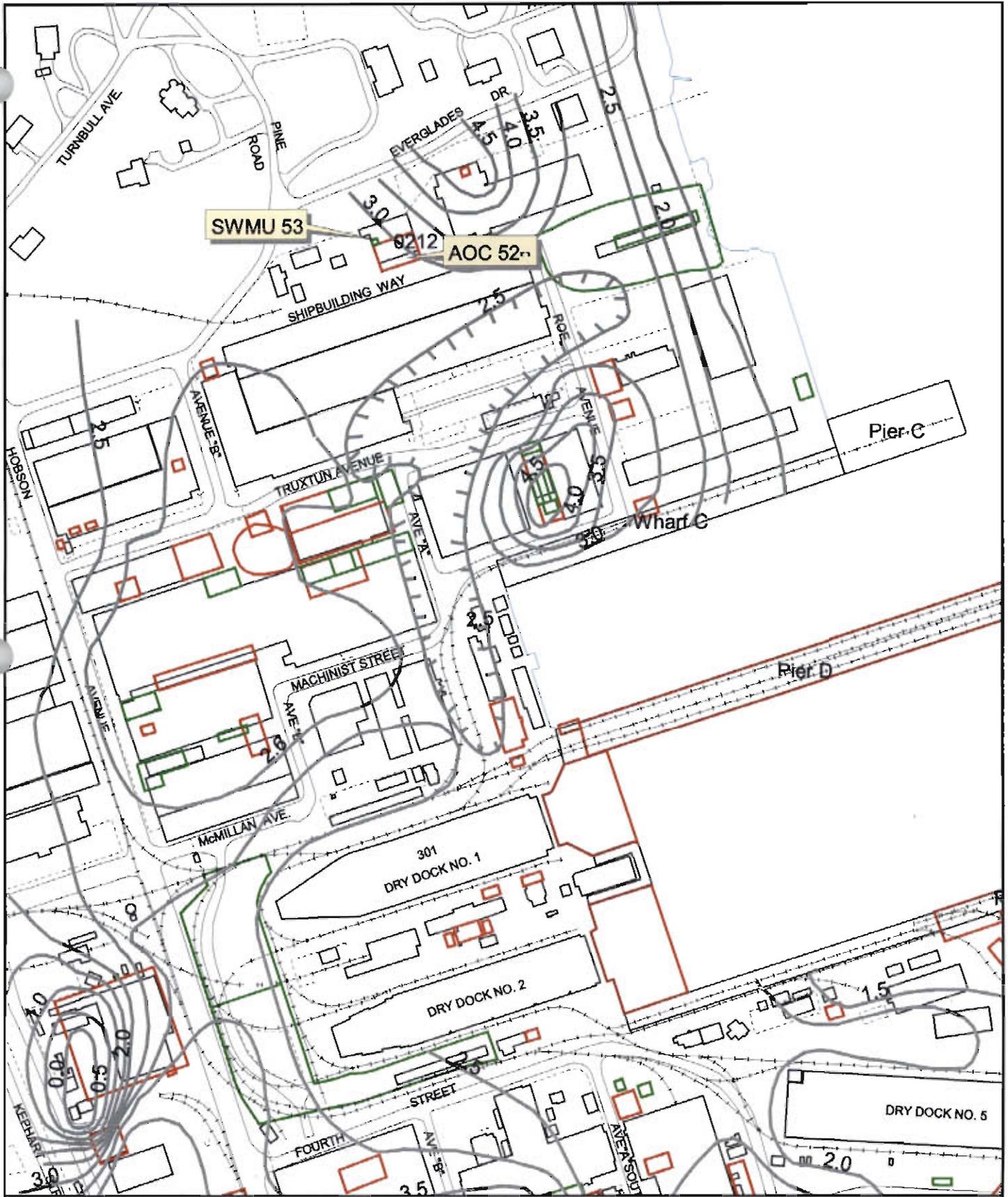
Parameter	Frequency of Detection	Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration			Units	Number Exceeding				
							Residential RBC	Industrial RBC	Reference		Res.	Ind.	Ref		
Carcinogenic PAHs															
B(a)P Equiv. * *	4	12	322.84	2316	837.29	785.74	1848.8	88	780	NA	UG/KG	4	1		
Benzo(a)anthracene	3	12	130	700	323.33	340	800	880	7800	NA	UG/KG				
Benzo(a)pyrene * *	4	12	210	1300	512.50	340	800	88	780	NA	UG/KG	4	1		
Benzo(b)fluoranthene	4	12	300	1200	590.00	340	800	880	7800	NA	UG/KG	1			
Benzo(k)fluoranthene	4	12	230	2500	867.50	340	800	8800	78000	NA	UG/KG				
Chrysene	3	12	200	1000	480.00	340	800	88000	780000	NA	UG/KG				
Dibenz(a,h)anthracene *	2	12	79	700	389.50	340	800	88	780	NA	UG/KG	1			
Indeno(1,2,3-cd)pyrene *	4	12	130	1000	377.50	340	800	880	7800	NA	UG/KG	1			
TCDD Equivalents															
Dioxin Equiv.	4	4	0.5749	8.489	2.97	NA	NA	1000	1000	NA	NG/KG				
Inorganics															
Aluminum (Al)	12	12	1450	6570	3481.67	NA	NA	7800	100000	26600	MG/KG				
Antimony (Sb)	7	12	0.61	2.6	1.12	0.43	1.2	3.1	82	1.77	MG/KG		1		
Arsenic (As)	11	12	2.2	10.7	5.88	1.8	1.8	0.43	3.8	23.9	MG/KG	11	7		
Barium (Ba)	10	12	9.5	24	17.38	8	10.8	550	14000	130	MG/KG				
Beryllium (Be)	10	12	0.16	0.39	0.24	0.14	0.17	0.15	1.3	1.7	MG/KG	10			
Cadmium (Cd)	8	12	0.06	0.5	0.26	0.11	0.12	3.9	100	1.5	MG/KG				
Calcium (Ca)	N	12	1810	46100	7585.83	NA	NA	NA	NA	NA	MG/KG				
Chromium (Cr)	*	12	4	193	42.11	NA	NA	39	1000	94.6	MG/KG	4	1		
Chromium (Hexavalent)		0	4	NA	NA	0.053	0.054	39	1000	NA	MG/KG				
Cobalt (Co)		12	1	12.3	4.58	NA	NA	470	12000	19	MG/KG				
Copper (Cu)		12	6.1	42.7	17.68	NA	NA	310	8200	66	MG/KG				
Iron (Fe)	N	12	2460	12800	6481.67	NA	NA	NA	NA	NA	MG/KG				
Lead (Pb)		12	11.8	105	45.70	NA	NA	400	1300	265	MG/KG				
Magnesium (Mg)	N	12	213	4350	939.58	NA	NA	NA	NA	NA	MG/KG				
Manganese (Mn)		12	28.2	75.5	52.79	NA	NA	180	4700	302	MG/KG				
Mercury (Hg)	*	12	0.06	8.8	0.94	NA	NA	2.3	61	2.6	MG/KG	1	1		
Nickel (Ni)		12	2.4	49.4	9.74	NA	NA	160	4100	77.1	MG/KG				
Potassium (K)	N	4	12	278	735	474.50	75.9	601	NA	NA	MG/KG				
Selenium (Se)		3	12	0.58	0.74	0.67	0.32	0.58	39	1000	1.7	MG/KG			
Silver (Ag)		3	12	1.4	2.2	1.90	0.2	0.22	39	1000	NA	MG/KG			
Sodium (Na)	N	1	12	73.6	73.6	73.60	40.8	85	NA	NA	MG/KG				
Thallium (Tl)		2	12	0.59	1.1	0.85	0.36	0.58	0.63	16	2.8	MG/KG	1		
Tin (Sn)		2	12	2.6	40.5	21.55	2.1	4.2	4700	6100	59.4	MG/KG			
Vanadium (V)		12	12	3.9	17.5	7.80	NA	NA	55	1400	94.3	MG/KG			
Zinc (Zn)		12	12	19	376	113.44	NA	NA	2300	61000	827	MG/KG			
Pesticides															
4,4'-DDD	4	12	3	7.6	4.83	2.6	3	2700	24000	NA	UG/KG				
4,4'-DDE	7	12	3.2	140	33.93	2.6	3	1900	17000	NA	UG/KG				
4,4'-DDT	6	12	4.5	58	25.08	2.6	3	1900	17000	NA	UG/KG				
alpha-Chlordane	1	12	1.7	1.7	1.70	1.4	1.6	470	2200	NA	UG/KG				
Aroclor-1260	1	12	55	55	55.00	70	79	83	740	NA	UG/KG				
Endrin aldehyde	1	12	3.2	3.2	3.20	2.6	3	2300	61000	NA	UG/KG				
gamma-Chlordane	2	12	2.3	3.4	2.85	1.4	1.6	470	2200	NA	UG/KG				
Heptachlor	2	12	1.6	2	1.80	1.4	1.5	140	1300	NA	UG/KG				
Semivolatile Organics															
Acenaphthylene	1	12	200	200	200.00	340	800	310000	8200000	NA	UG/KG				
Anthracene	1	12	230	230	230.00	340	800	2300000	61000000	NA	UG/KG				
Benzo(g,h,i)perylene	4	12	170	1600	552.50	340	800	310000	8200000	NA	UG/KG				
Di-n-butylphthalate	1	12	93	93	93.00	340	800	780000	20000000	NA	UG/KG				
Fluoranthene	3	12	120	780	346.67	340	800	310000	8200000	NA	UG/KG				
Phenanthrene	1	12	170	170	170.00	340	800	310000	8200000	NA	UG/KG				
Pyrene	4	12	180	810	357.50	340	800	230000	6100000	NA	UG/KG				
Volatile Organic Compounds															
Acetone	2	12	120	150	135.00	10	38	780000	20000000	NA	UG/KG				

* - Identified as a residential COPC
 ** - Identified as an industrial COPC
 N - Essential nutrient
 MG/KG - milligrams per kilogram
 UG/KG - micrograms per kilogram
 NG/KG - nanograms per kilogram
 SQL - Sample quantitation limit
 RBC - Risk-based concentration
 NA - Not applicable

Table 10.5.D
 Chemicals Present in Site Samples
 SWMU 53; AOC 526 - Groundwater
 NAVBASE - Charleston
 Charleston, SC

Parameter	Frequency of Detection	Range of Detection	Average Detected Concentration	Range of SQL	Screening Concentration		Units	Number Exceeding		
					Residential RBC	Reference		Res.	Ref.	
Deep wells										
Inorganics										
Calcium (Ca)	N	1 1	89600 89600	89600	NA	NA	NA	NA	UG/L	
Magnesium (Mg)	N	1 1	12000 12000	12000	NA	NA	NA	NA	UG/L	
Manganese (Mn)		1 1	56.7 56.7	56.7	NA	NA	84	869	UG/L	
Shallow Wells										
Inorganics										
Aluminum (Al)		2 3	399 1110	754.5	25	25	3700	2810	UG/L	
Arsenic (As)		1 3	9.4 9.4	9.4	5	5	0.045	18.7	UG/L	1
Calcium (Ca)	N	3 3	66600 151000	111866.7	NA	NA	NA	NA	UG/L	
Chromium (Cr)		1 3	2 2	2	1	1	18	12.3	UG/L	
Cobalt (Co)		1 3	2.2 2.2	2.2	2	2	220	2.5	UG/L	
Copper (Cu)		1 3	3.3 3.3	3.3	2	10	150	2.7	UG/L	1
Iron (Fe)	N	3 3	1180 9650	5640	NA	NA	1100	NA	UG/L	
Lead (Pb)		1 3	3.3 3.3	3.3	3	3	15	4.8	UG/L	
Magnesium (Mg)	N	3 3	6020 28000	20440	NA	NA	NA	NA	UG/L	
Manganese (Mn)		3 3	69.7 439	311.9	NA	NA	84	2560	UG/L	2
Nickel (Ni)		1 3	2 2	2	1	1.5	73	15.2	UG/L	
Potassium (K)	N	3 3	15600 21400	18400	NA	NA	NA	NA	UG/L	
Volatile Organics										
1,2-Dichloroethene (total)		1 3	1 1	1	5	5	5.5	NA	UG/L	

N - Essential Nutrient
 UG/L - micrograms per liter
 SQL - Sample quantitation limit



- Shallow Groundwater Contours ft bls
- Fence
- Railroads
- Roads
- AOC boundary
- SWMU boundary
- buildings
- Zone boundary

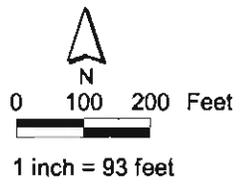
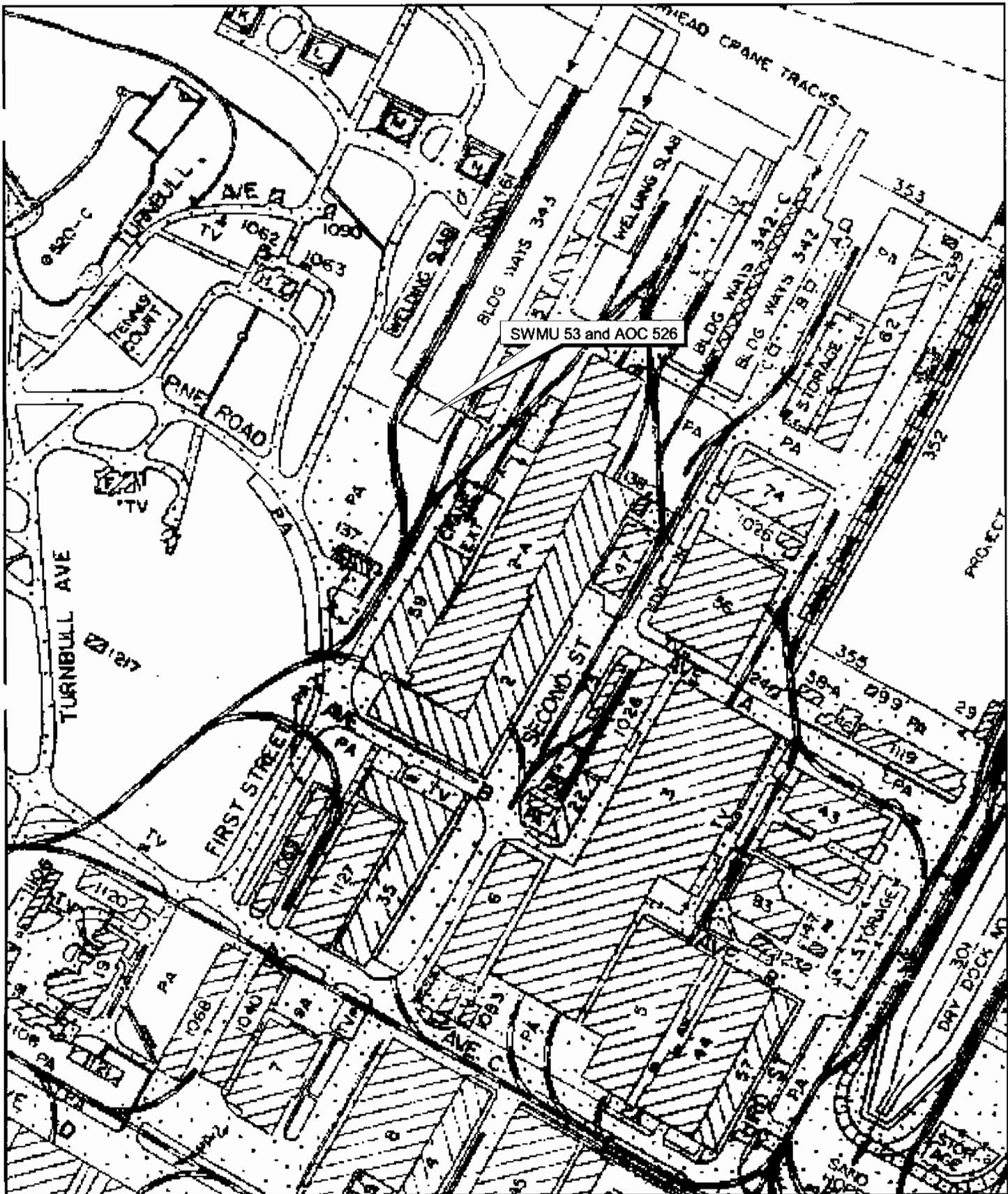


Figure A-1
 Shallow Groundwater Contour Map
 SWMU 53 and AOC 52r, Zone E
 Charleston Naval Complex

Appendix B



 Railroad Line November 3, 1955



Figure B-1
 Historical Railroad Location Map
 SWMU 53 and AOC 526, Zone E
 Charleston Naval Complex