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CNC CHARLESTON  
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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT  
ADDENDUM AREA OF CONCERN 562 (AOC 562) ZONE E CNC CHARLESTON SC  
7/30/2002  
CH2M HILL

# RFI REPORT ADDENDUM

## Area of Concern 562. Zone E



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

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

*CH2M Jones*

*July 2002*

*Contract N62467-99-C-0960*



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July 30, 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) – AOC 562, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum (Revision 0) for AOC 562 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

A handwritten signature in cursive script that reads "Dean Williamson".

Dean Williamson, P.E.

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

RFI REPORT ADDENDUM

**Area of Concern 562, Zone E**



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

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

PREPARED BY  
***CH2M-Jones***

*July 2002*

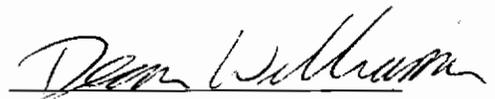
*Revision 0  
Contract N62467-99-C-0960  
158814.ZE.PR.01*

**Certification Page for RFI Report Addendum (Revision 0) –  
AOC 562, Zone E**

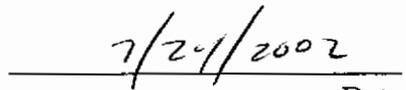
I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.



Date

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7		<b>Appendices</b>	
8	<b>A</b>	Figure A-1 showing shallow groundwater contours in the vicinity of the site, and	
9		excerpts from the <i>Zone E RFI Report, Revision 0</i> (EnSafe, 1997) showing a summary of	
10		detections of chemicals in soil at the site	
11	<b>B</b>	Responses to SCDHEC Comments on AOC 562 of the <i>Zone E RFI Report, Revision 0</i>	
12		(EnSafe, 1997)	

# 1 Acronyms and Abbreviations

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2	AOC	Area of concern
3	AST	Aboveground storage tank
4	BCT	BRAC Cleanup Team
5	BRAC	Base Realignment and Closure Act
6	BRC	Background reference concentration
7	CA	Corrective action
8	CMS	Corrective measures study
9	CNC	Charleston Naval Complex
10	COC	Chemical of concern
11	COPC	Chemical of potential concern
12	CSI	Confirmatory sampling investigation
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	NAVBASE	Naval Base
25	NFA	No further action
26	OWS	Oil/water separator
27	PCB	Polychlorinated biphenyl
28	ppm	Parts per million
29	RBC	Risk-based concentration
30	RCRA	Resource Conservation and Recovery Act

# 1 **Acronyms and Abbreviations, Continued**

---

2	RFI	RCRA Facility Investigation
3	SCDHEC	South Carolina Department of Health and Environmental Control
4	SSL	Soil screening level
5	SVOC	Semivolatile organic compound
6	SWMU	Solid waste management unit
7	TDS	Total dissolved solids
8	UST	Underground storage tank
9	VOC	Volatile organic compound



# 1 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 Permit (Permit No. SC0 170 022 560).

11 In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation  
12 and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to  
13 complete the RCRA Facility Investigation (RFI) for Area of Concern (AOC) 562 in Zone E of  
14 CNC. The site is recommended for no further action (NFA). Figure 1-1 illustrates the  
15 location of Zone E within the CNC. Figure 1-2 shows an aerial view of AOC 562 within  
16 Zone E.

## 17 1.1 Background

18 AOC 562 is an electrical substation located adjacent to Building 84. The substation was  
19 constructed in 1942 and consists of a concrete slab within a fenced area, containing several  
20 weatherproof metal-enclosed transformers. Building 84 is a single-story structure with a  
21 concrete slab floor and roof. It is currently used by CMMC, Inc. as an office building. The  
22 area around the site is paved.

23 In 1986, two of the transformers at the site were reported to be leaking. Analytical test  
24 results showed that the transformers contained less than 50 parts per million (ppm)  
25 polychlorinated biphenyls (PCBs). In 1987, samples taken from a third transformer at the  
26 site reported a PCB concentration of 249.7 ppm; this transformer was reported in good  
27 condition. All transformers were removed in 1988 prior to the RFI.

28 The material of concern identified in the *Final Zone E RFI Work Plan, Revision 1* (EnSafe Inc.  
29 [EnSafe]/Allen & Hoshall, 1995) was dielectric fluid. This area of Zone E is zoned M2

1 (industrial). The CNC RCRA Permit identified AOC 562 as requiring a confirmatory  
2 sampling investigation (CSI).

3 The RFI was initially conducted by the Navy/EnSafe Inc. team. The RFI activities were  
4 documented in the *Zone E RFI Report, Revision 0* (EnSafe, 1997). Regulatory review was  
5 conducted on this document and a draft response to the comments from SCDHEC were  
6 prepared by the Navy/EnSafe team.

## 7 **1.2 Purpose of the RFI Report Addendum**

8 The purpose of this RFI Report Addendum is to document the results of previous RFI  
9 investigations conducted by EnSafe at AOC 562. This RFI Report Addendum also discusses  
10 various closeout issues and the findings of previous investigations, existing site conditions,  
11 and surrounding area land use.

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

- 14 • Status of the RFI
- 15 • Presence of metals (inorganics) in groundwater
- 16 • Potential linkage to Solid Waste Management Unit (SWMU) 37, Investigated Sanitary  
17 Sewers at the CNC
- 18 • Potential linkage to AOC 699, Investigated Storm Sewers at the CNC
- 19 • Potential linkage of AOC 504, Investigated Railroad Lines at the CNC
- 20 • Potential linkage to surface water bodies (Zone J)
- 21 • Potential contamination associated with oil/water separators (OWSs)
- 22 • Relevance or need for land use controls (LUCs) at the site

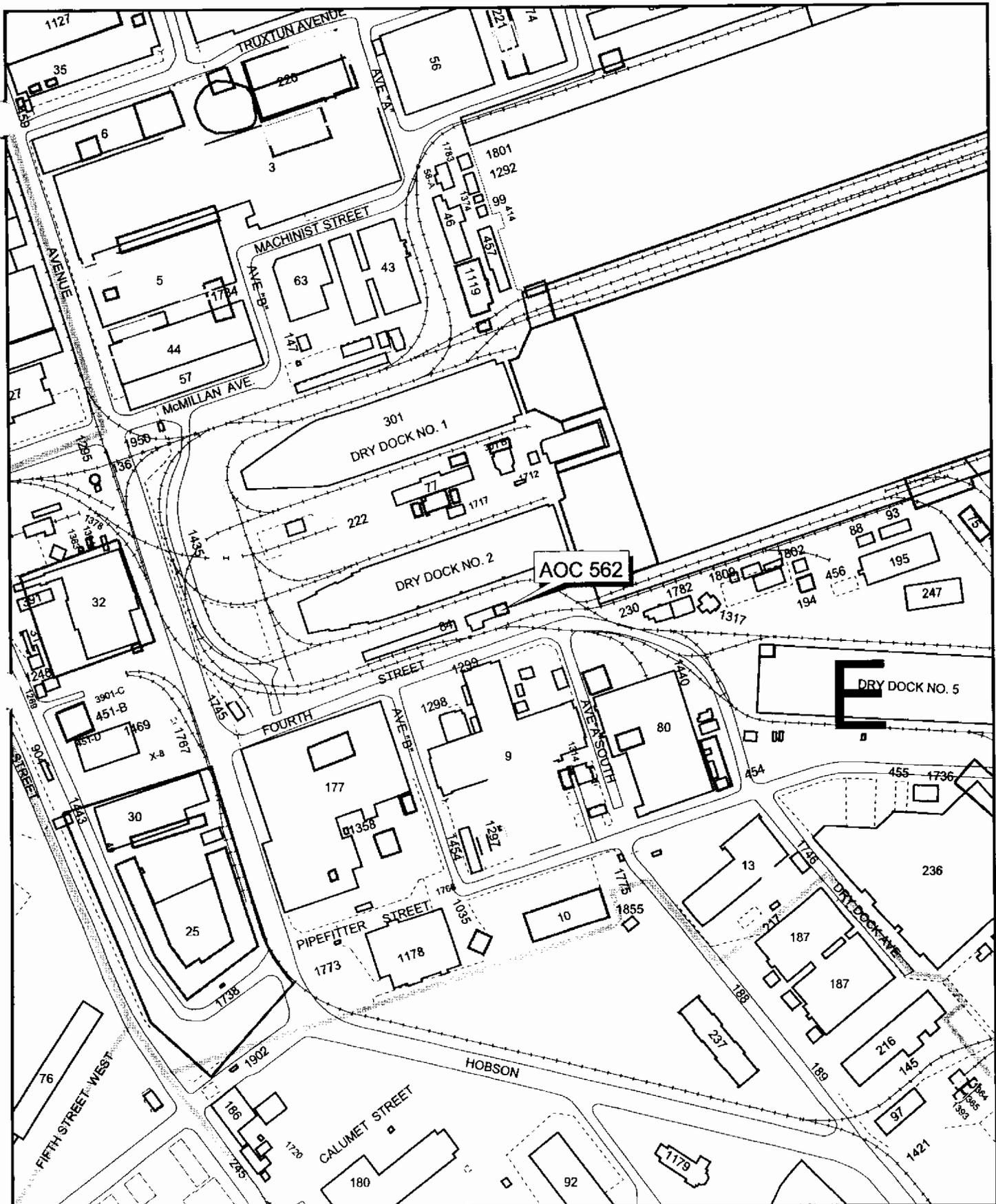
23 Information regarding these issues is provided in this RFI Report Addendum to expedite  
24 evaluation of closure of the site.

## 25 **1.3 Report Organization**

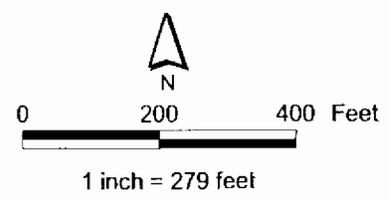
26 This RFI Report Addendum consists of the following sections, including this introductory  
27 section:

28 **1.0 Introduction** – Presents the purpose of the report and background information relating  
29 to the RFI Report Addendum.

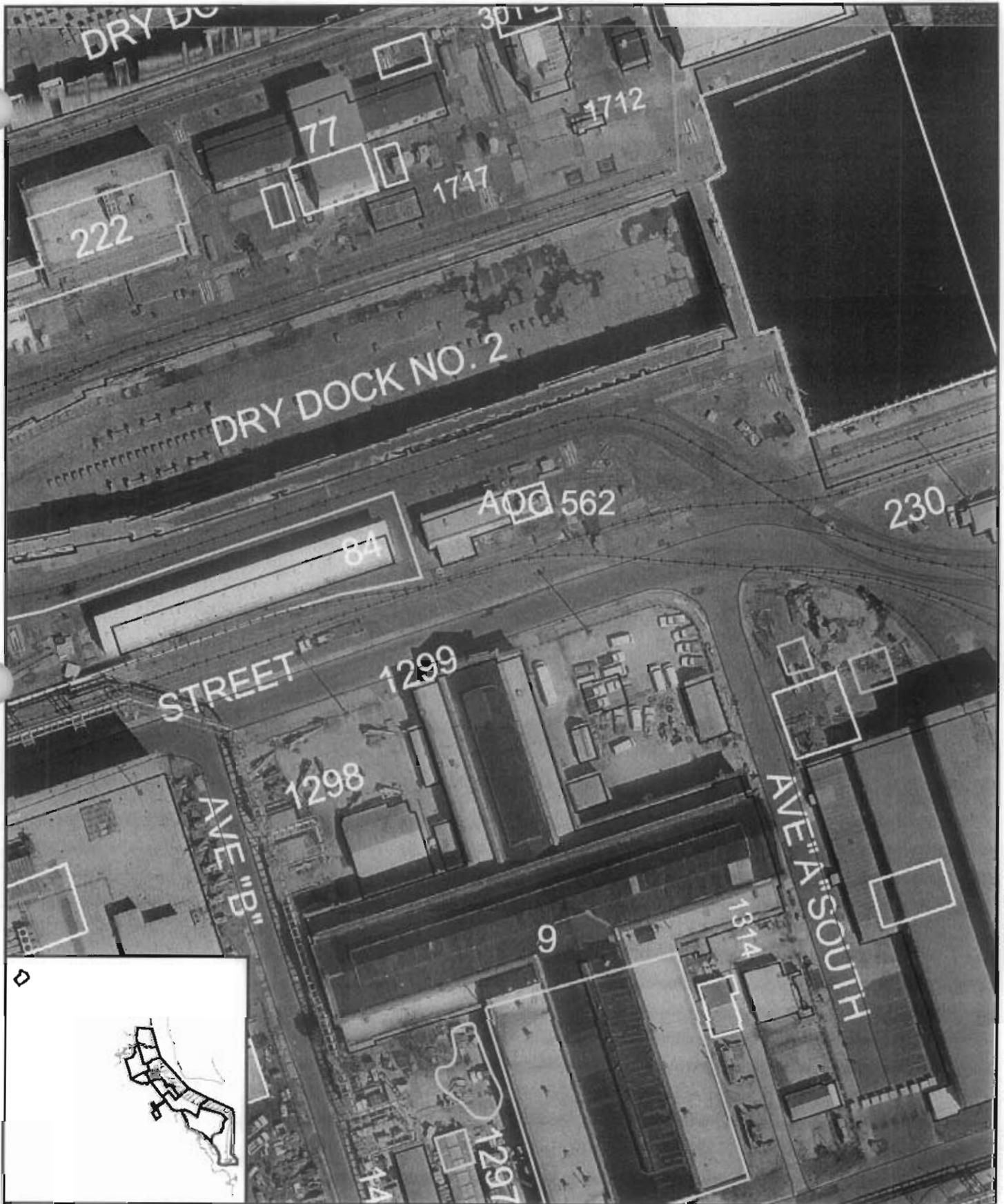
- 1 **2.0 Summary of RFI Conclusions for AOC 562** – Summarizes the conclusions from the RFI  
2 investigations and risk evaluations for AOC 562 as presented in the RFI report.
- 3 **3.0 Interim Measures and UST/AST Removals** – Provides information regarding any  
4 interim measures (IMs) or underground storage tank (UST)/ aboveground storage tank  
5 (AST) removal activities performed at the site.
- 6 **4.0 Summary of Additional Investigations** – Summarizes information, if any, collected  
7 after completion of the RFI report.
- 8 **5.0 COPC/COC Refinement** – Provides further evaluation of chemicals of potential concern  
9 (COPC) based on RFI and additional data to assess them as chemicals of concern  
10 (COCs).
- 11 **6.0 Summary of Information Related to Site Closeout Issues** – Discusses the various site  
12 closeout issues that the BCT agreed to evaluate prior to site closeout.
- 13 **7.0 Recommendations** – Provides recommendations for proceeding with site closure.
- 14 **8.0 References** – Lists the references used in this document.
- 15 **Appendix A** – Contains excerpts from the RFI report, including summary of detections of  
16 chemicals and a groundwater flow map for the site vicinity.
- 17 **Appendix B** – Contains responses to SCDHEC comments for AOC 562 from the RFI report.
- 18 All figures and tables appear at the end of their respective sections.



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



**Figure 1-1**  
 Location of AOC 562 in Zone E  
 Charleston Naval Complex



**Figure 1-2:**  
Aerial Photograph of AOC 562  
Zone E.  
Charleston Naval Complex



## 1 **2.0 Summary of RFI Conclusions for AOC 562**

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2 This section summarizes the results and conclusions from soil and wipe sample  
3 investigations conducted at AOC 562 which were reported in the *Zone E RFI Report, Revision*  
4 *0* (EnSafe, 1997).

5 As part of the Zone E RFI, soil and concrete wipe sample investigations were conducted at  
6 AOC 562 during 1995. The RFI report presented the results of these investigations and  
7 conclusions concerning contamination and risk, as summarized in the following sections.

### 8 **2.1 Soil Sampling and Analysis**

9 The EnSafe field investigation at AOC 562 consisted of a single sampling event, with  
10 collection and analysis of three surface soil and three subsurface soil samples from locations  
11 under concrete and asphalt pavement. Figure 2-1 shows the RFI sample locations at AOC  
12 562. All samples were analyzed for PCBs. Volatile organic compounds (VOCs) were  
13 analyzed in one surface soil sample and two subsurface soil samples. These boring locations  
14 were identified as E562SB001, E562SB002, and E562SB004.

#### 15 **2.1.1 Surface Soil Results**

16 During the RFI, surface soil detections of organic compounds were evaluated against the  
17 EPA Region III industrial risk-based concentrations (RBCs) (with a hazard index [HI]=0.1  
18 for noncarcinogens).

19 Detected concentrations of analytes exceeding their respective criteria are as follows:

- 20 • **VOCs:** There were no VOC detections that exceeded the screening criteria in surface soil  
21 samples from AOC 562.
- 22 • **PCBs:** No PCBs were detected above laboratory detection limits for surface soils.

#### 23 **2.1.2 Subsurface Soil Results**

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

26 Detected concentrations of compounds from subsurface soil samples are as follows:

- 27 • **VOCs:** No VOC detections exceeded the screening criteria in subsurface soils.

- 1 • **PCBs:** There were no PCB detections above laboratory detection limits in subsurface soil  
2 samples from AOC 562.

## 3 **2.2 Wipe Sampling and Analysis**

4 During the RFI, four wipe samples were proposed for AOC 562. Sample locations were  
5 determined in the field to identify the areas with the heaviest-possible contamination. The  
6 samples were collected in the field based on the location of PCB-containing equipment and  
7 visual evidence of spills and leaks. The four wipe samples were analyzed for PCBs. Results  
8 from the wipe samples showed that PCBs were present in one of the four samples at a  
9 concentration of 9.8  $\mu\text{g}/100\text{ cm}^2$ . No residential or industrial RBCs exist for wipe samples.

## 10 **2.3 RFI Human Health Risk Assessment (HHRA)**

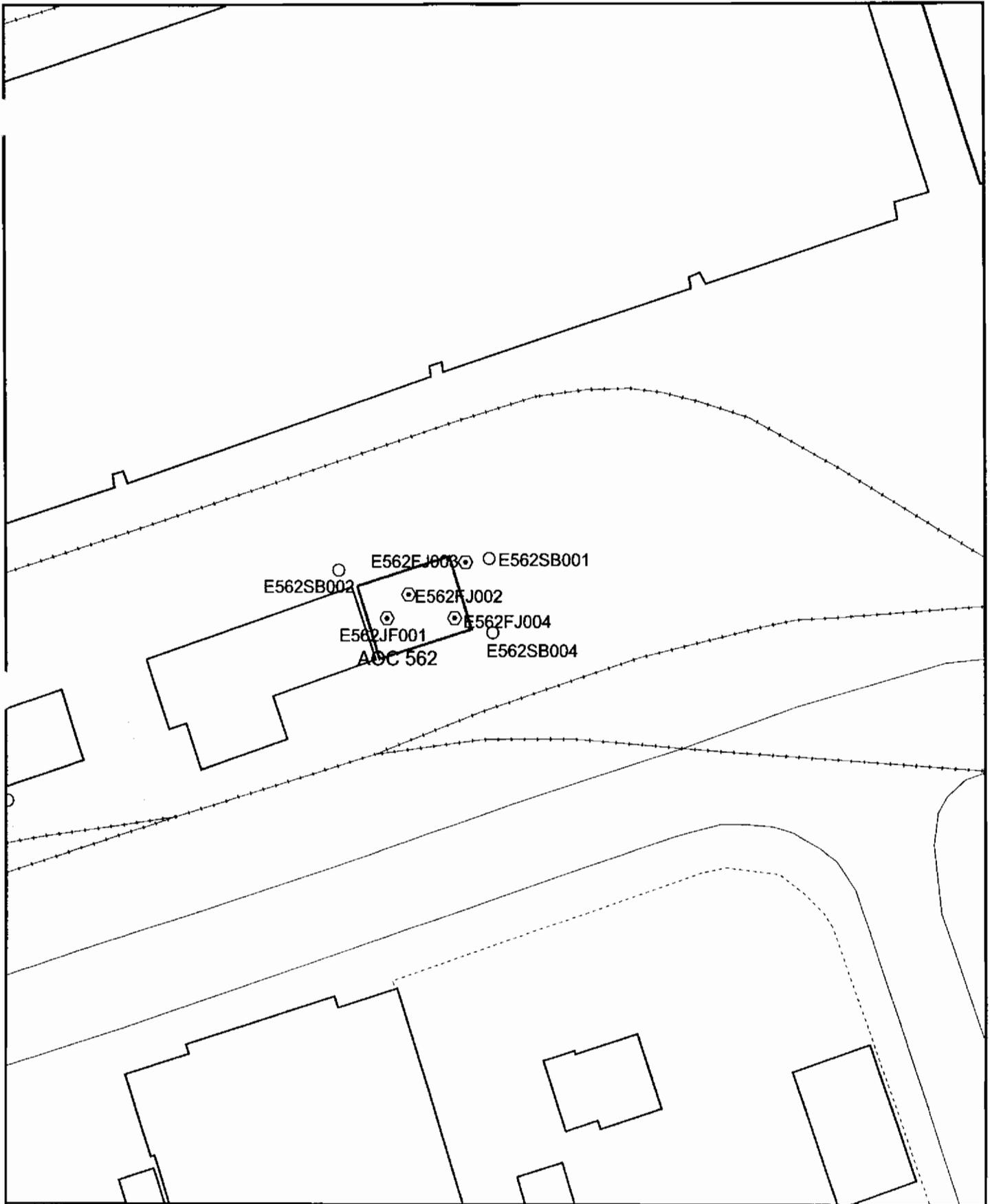
11 The RFI report used a fixed-point risk evaluation (FRE) approach at this site. The FRE  
12 considered site resident and site worker scenarios during the FRE. The detailed risk  
13 assessment for the AOC 562 site is presented in Sections 10.30.6 of the RFI report.

### 14 **2.3.1 Soils**

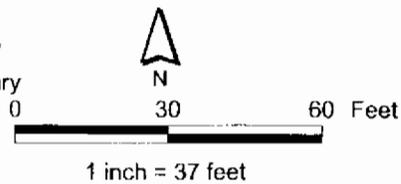
15 The human health risk assessment (HHRA) for AOC 562 identified no COCs for soil under  
16 either the unrestricted (residential) or industrial future land use scenarios.

## 17 **2.4 RFI Conclusions and Recommendations**

18 The RFI report recommended no further action or corrective measures at AOC 562.



- Soil Sampling Location
- ⊙ Wipe Sampling Location
- ▭ Buildings
- ▭ Zone Boundary
- ▭ SWMU Boundary
- ▭ Fence
- ▭ Railroads
- ▭ Shoreline
- ▭ AOC Boundary



**Figure 2-1**  
RFI Sample Locations  
AOC 562, Zone E  
Charleston Naval Complex



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

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### 2 **3.1 UST/AST Removals**

3 There is no indication of a UST or AST being present at this site.

### 4 **3.2 Interim Measures**

5 No IMs were conducted at AOC 562.



## 1 **4.0 Summary of Additional Investigations**

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- 2 No additional investigations have been conducted at AOC 562 since the RFI field
- 3 investigations conducted by EnSafe during the period of 1995-1997.



## 1 **5.0 COPC/COC Refinement**

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- 2 The *Zone E RFI Report, Revision 0* did not identify any COCs at AOC 562.
- 3 The BCT has agreed that soil VOC data will be rescreened against generic SSLs, using a  
4 DAF=1. Two VOCs, acetone and carbon disulfide, were detected in the surface and  
5 subsurface soil sample from soil boring E562SB001. These detections are presented in Table  
6 5-1, which also presents their respective SSLs based on a DAF=1. The data indicate that the  
7 VOCs do not exceed the SSL screening criteria.
- 8 Based on this screening, no COCs have been identified for this site.

**TABLE 5-1**  
 Detected Concentrations of VOCs Acetone and Carbon Disulfide in Soil  
*RFI Report Addendum, AOC 562, Zone E, Charleston Naval Complex*

Parameter	Station ID	Sample ID	Concentration (mg/kg)	Qualifier	Date Collected	EPA Region III Residential RBC	SSL (DAF=1)	Zone E Background Range of Conc.
<b>Acetone</b>	<b>Surface Soil</b>							
	562SB001	562SB00101	0.062	=	12/05/1995	780	0.8	NA
<b>Carbon Disulfide</b>	<b>Subsurface Soil</b>							
	562SB001	562SB00102	0.06500	=	12/05/1995	780	0.8	NA
	<b>Surface Soil</b>							
	562SB001	562SB00101	0.002	J	12/05/1995	780	2	NA
	<b>Subsurface Soil</b>							
	562SB001	562SB00102	0.00400	J	12/05/1995	780	2	NA

All values are presented in units of 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 is detected at the concentration shown.
- NA Not Applicable



## 1 **6.0 Summary of Information Related to Site** 2 **Closeout Issues**

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### 3 **6.1 RFI Status**

4 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/AOCs within Zone E of  
5 the CNC, including AOC 562.

6 In accordance with the RFI completion process, if a determination of No Further  
7 Investigation (NFI) is made upon completion of the RFI, then a site may proceed to either  
8 NFA status or to a CMS. The RFI for AOC 562 did not identify any COC for soil. Based on  
9 the discussion presented in Section 5.0 above, no COCs were identified at this site.

10 Therefore, this site is recommended for no further corrective action.

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

### 13 **6.2 Presence of Inorganics in Groundwater**

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

19 Groundwater was not a media of concern and was not investigated at AOC 562.

### 20 **6.3 Potential Linkage to SWMU 37, Investigated Sanitary** 21 **Sewers at the CNC**

22 There are no tanks or OWSs associated with AOC 562. Therefore, there are no concerns  
23 regarding connections to the sanitary sewer. Therefore, further evaluation of this issue is  
24 not warranted.

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

3    The nearest storm drain is located approximately 35 feet northeast of the western boundary  
4    of AOC 562. The sections of the stormwater sewer system in the vicinity of the site were not  
5    investigated as part of the AOC 699 investigations. There is no evidence of past site uses or  
6    the presence of contamination near the stormwater sewer system near the site that could  
7    have potentially impacted the stormwater sewer system. Based on these findings, further  
8    evaluation of this issue is not warranted.

## 9    **6.5 Potential Linkage to AOC 504, Investigated Railroad Lines** 10   **at the CNC**

11   There is no known linkage between AOC 562 and the investigated railroad lines of AOC  
12   504, and further evaluation of this issue is not warranted.

## 13   **6.6 Potential Migration Pathways to Surface Water Bodies at** 14   **the CNC**

15   The nearest surface water body to AOC 562 is the Cooper River , which lies approximately  
16   190 feet to the northeast. The only potential migration pathway from the site to surface  
17   water is via overland flow via stormwater runoff. Since the entire site is covered with  
18   buildings and pavement, which eliminates contact of surface soil with stormwater, further  
19   evaluation of a potential pathway for contaminant migration via stormwater runoff is not  
20   warranted. Similarly, runoff directed to the storm sewer system, which discharges to the  
21   Cooper River, does not contact the surface soil.

22   The groundwater is not a media of concern at this unit. No data indicate that groundwater  
23   has been impacted at the site. Therefore, further evaluation of potential migration of  
24   contaminated groundwater to a surface water body is not warranted.

## 25   **6.7 Potential Contamination in Oil/Water Separators (OWSs)**

26   There are no OWSs associated with AOC 562. In addition, there is no reference to an OWS  
27   at this facility in the *Oil Water Separator Data* report (Department of the Navy, September  
28   2000). Therefore, further evaluation of this issue is not warranted.

## 1 **6.8 Land Use Controls (LUCs)**

2 The RFI screening did not identify any COCs at AOC 562. This evaluation was based on a  
3 residential land use classification, which is considered unrestricted use and is conservative.  
4 Therefore, LUCs are not necessary at this site.

5  
6 However, the BCT has agreed that LUCs will be applied across all of Zone E, including the  
7 location of AOC 562. These LUCs are expected to include, at a minimum, the restriction of  
8 future land use to non-residential activities. Because of the location of AOC 562 within  
9 Zone E, these LUCs will apply at this site.

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## **Section 7.0**

## 1 **7.0 Recommendations**

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2 AOC 562 is an electrical substation located adjacent to Building 84. The substation was  
3 constructed in 1942 and consists of a concrete slab within a fenced area, containing several  
4 weatherproof metal-enclosed transformers. Building 84 is a single-story structure with a  
5 concrete slab floor and roof. It is currently used by CMMC, Inc. as an office building. The  
6 area around the site is paved.

7 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) did not identify any COCs at AOC 562 and  
8 concludes that no further corrective measures are necessary for the AOC 562 site. An  
9 evaluation of the data, as described in this report, confirms this recommendation. Therefore,  
10 this site is recommended for NFA.

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



## 1 8.0 References

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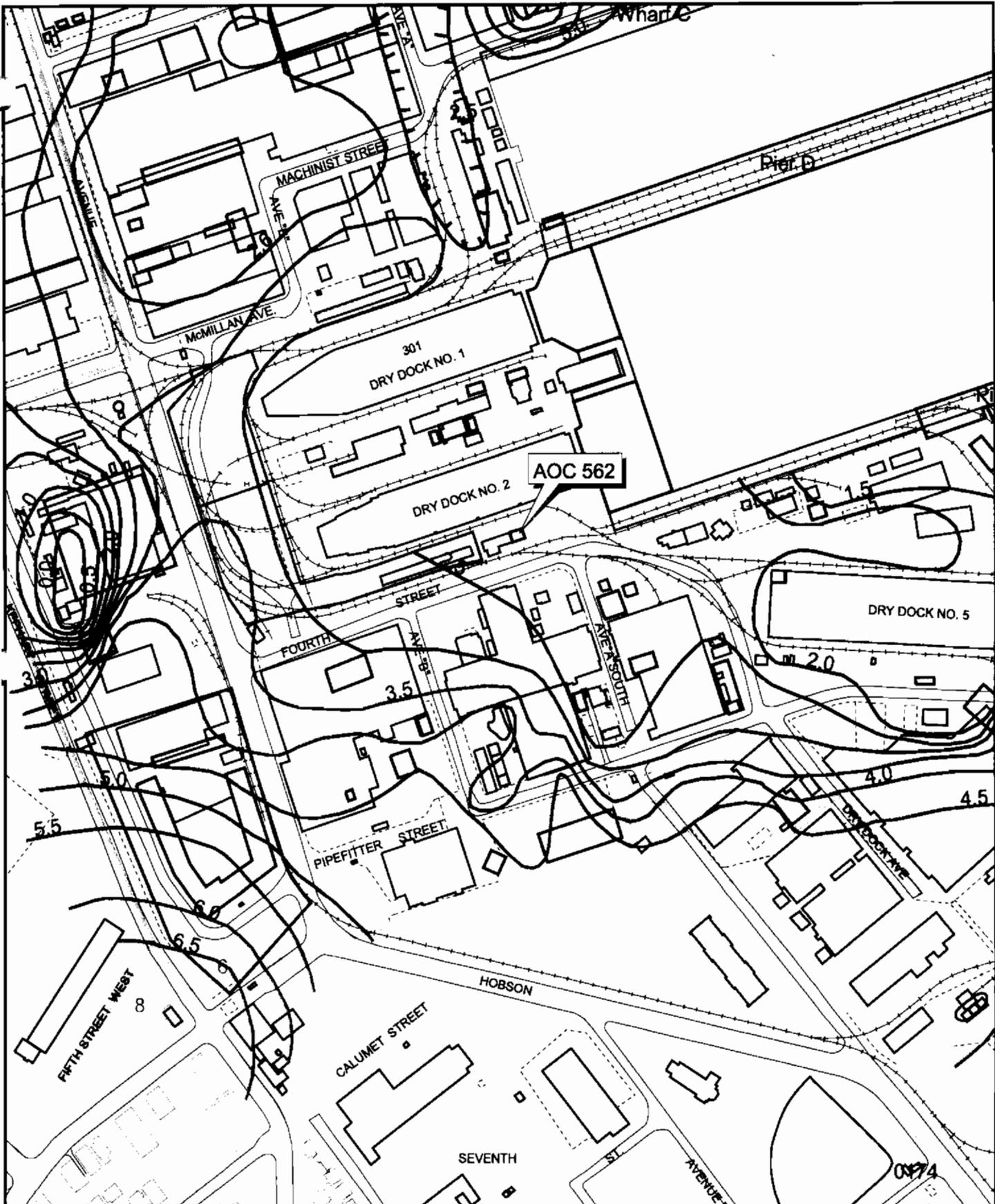
- 2 EnSafe Inc. *Zone E RFI Report, Revision 0, NAVBASE Charleston.* 1997.
- 3 EnSafe Inc./Allen & Hoshall. *Final RCRA Facility Assessment, NAVBASE Charleston.* July  
4 1995.
- 5 EnSafe Inc./Allen & Hoshall. *Final Zone E RFI Work Plan, Revision 1, NAVBASE Charleston.*  
6 June 1995.
- 7 CH2M-Jones.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



Table 10.30.A  
 Chemicals Present in Site Samples  
 AOC 562 - Surface Soil  
 NAVBASE - Charleston, Zone E  
 Charleston, South Carolina

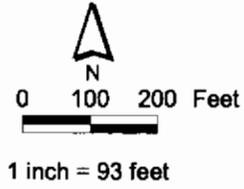
Parameter	Frequency of Detection		Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration			Units	Number Exceeding		
								Residential RBC	Industrial RBC	Reference		Res.	Ind.	Ref.
Acetone	1	1	62	62	62	NA	NA	780000	20000000	NA	UG/KG			
Carbon disulfide	1	1	2	2	2	NA	NA	780000	20000000	NA	UG/KG			

SQL - Sample quantitation limit  
 UG/KG - microgram per kilogram  
 NA - Not applicable



**Figure A-1**  
 Shallow Groundwater Contour Map  
 AOC 562, Zone E  
 Charleston Naval Complex

- Shallow Groundwater Contours ft bls
- Fence
- Railroads
- Roads
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary





**Responses To Comments from Dynamac/Gannett Fleming  
on the Draft Zone E RCRA Facility Investigation Report (EnSafe, 1999)**

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**AOC 562**

**Comment**

Section 10.30.2, Page 10.30-4, Line 2: The text states that acetone and carbon disulfide were detected in two lower-interval samples. This statement is incorrect. Both VOCs were detected in one of two lower-interval samples, according to Table 10.30.2.1 (page 10.30-3). The text should be corrected.

**Navy/EnSafe Team Response:**

The text will be revised to reflect this correction.

**CH2M-Jones Response:**

*Comment noted. No additional response.*