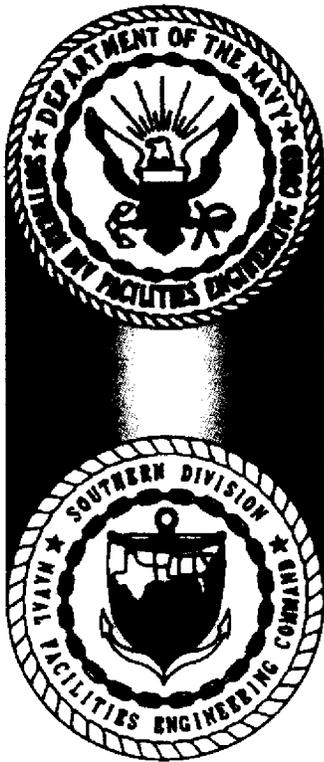


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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT
ADDENDUM CORRECTIVE MEASURES STUDY WORK PLAN AREA OF CONCERN 586
(AOC 586) ZONE E CNC CHARLESTON SC
12/13/2002
CH2M HILL

RFI REPORT ADDENDUM

RFI Report Addendum and CMS Work Plan AOC 586. Zone E



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

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

CH2M Jones

December 2002

Contract N62467-99-C-0960



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December 13, 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 and CMS Work Plan (Revision 1) – AOC 586, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum and CMS Work Plan (Revision 1) for AOC 586 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

RFI Report Addendum and CMS Work Plan AOC 586, Zone E



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

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

PREPARED BY
CH2M-Jones

December 2002

*Revision 1
Contract N62467-99-C-0960
158814.ZE.PR.01*

Certification Page for RFI Report Addendum and CMS Work Plan (Revision 1) – AOC 586, Zone E

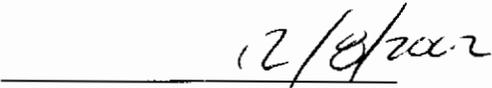
I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.



Date

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28	C CH2M-Jones' Responses to SCDHEC Comments on the <i>RFI Report Addendum, AOC</i>	
29	<i>586, Zone E, Revision 0</i> (August 2002)	

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	CMS	Corrective measures study
10	CNC	Charleston Naval Complex
11	COC	Chemical of concern
12	COPC	Chemical of potential concern
13	CSI	Corrective Study Investigation
14	DAF	Dilution attenuation factor
15	EnSafe	EnSafe Inc.
16	EPA	U.S. Environmental Protection Agency
17	FRE	Fixed-point risk evaluation
18	HHRA	Human Health Risk Assessment
19	HI	Hazard index
20	IM	Interim measure
21	LUC	Land use control
22	MCL	Maximum contaminant level
23	MCS	Media cleanup standard
24	mg/kg	Milligrams per kilogram
25	NAVBASE	Naval Base
26	NFA	No further action
27	NFI	No further investigation
28	OWS	Oil/water separator
29	PCB	Polychlorinated biphenyl
30	RAO	Remedial action objective

1 **Acronyms and Abbreviations, Continued**

2	RBC	Risk-based concentration
3	RCRA	Resource Conservation and Recovery Act
4	RFI	RCRA Facility Investigation
5	RGO	Remedial goal option
6	RI	Remedial investigation
7	SCDHEC	South Carolina Department of Health and Environmental Control
8	SSL	Soil screening level
9	SVOC	Semivolatile organic compound
10	SWMU	Solid waste management unit
11	TDS	Total dissolved solids
12	VOC	Volatile organic compound
13	UST	Underground storage tank

1.0 Introduction

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

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

In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to complete the RCRA Facility Investigation (RFI) for Area of Concern (AOC) 586 in Zone E of the CNC. The location of AOC 586 in Zone E is shown in Figure 1-1. Figure 1-2 is an aerial photograph of the site.

1.1 Background

AOC 586 consisted of a temporary powerhouse built in 1905 that was designated as Building 1014. AOC 586 is located approximately 300 feet west of the intersection of Necessary Lane and River Road in Zone E of the CNC. In 1953 an annex was added to Building 1014. In 1944, Building 1014 was connected to Building 1077. The combined structure was used for industrial salvage, which included a battery shop. Building 1014 was demolished around 1957. Currently, AOC 586 consists of a concrete slab adjacent to the southeast corner of Building 11. Railroad lines run through the middle of the site.

The materials of concern identified in the *Final Zone E RFI Work Plan, Revision 1* (EnSafe Inc. [EnSafe]/Allen & Hoshall, 1995) which are based on historical operations for AOC 586, include acids, solvents, dielectric fluid, lead-acid batteries, coal by-products, and petroleum hydrocarbons. This area of Zone E is zoned M-2 (industrial). The CNC RCRA Permit identified AOC 586 as requiring a Confirmatory Sampling Investigation (CSI).

1 Following fieldwork conducted for the RFI, the *Zone E RFI Report, Revision 0* (EnSafe, 1997)
2 was prepared and submitted during 1997. Regulatory review was conducted on this
3 document and draft responses to the comments from SCDHEC were prepared by the
4 Navy/EnSafe team.

5 **1.2 Purpose of the RFI Report Addendum**

6 The purpose of this RFI Report Addendum is to document the results of previous RFI
7 investigations conducted by the Navy/EnSafe team at AOC 586. This RFI Report
8 Addendum also discusses the findings of previous investigations, existing site conditions,
9 and surrounding area land use.

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

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

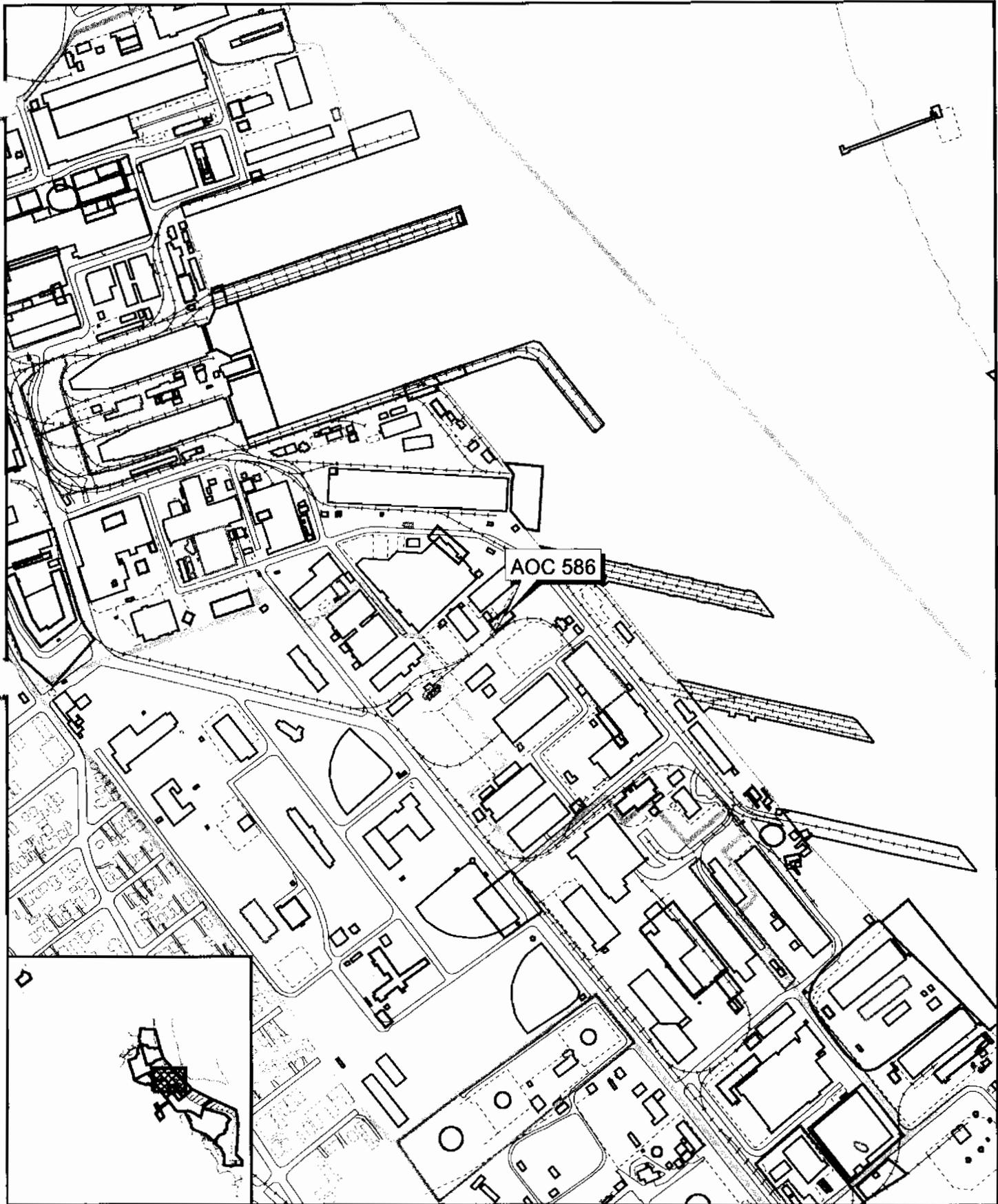
21 Information regarding these issues is also provided in this RFI Report Addendum to
22 expedite evaluation of closure of the site.

23 **1.3 Report Organization**

24 This RFI Report Addendum consists of the following sections, including this introductory
25 section:

26 **1.0 Introduction** – Presents the purpose of the report and background information relating
27 to the RFI Report Addendum.

- 1 **2.0 Summary of RFI Conclusions for AOC 586** – Summarizes the conclusions from the RFI
2 investigations and risk evaluation for AOC 586 as presented in the *Zone E RFI Report,*
3 *Revision 0* (EnSafe, 1997).
- 4 **3.0 Interim Measures and UST/AST Removals** – Provides information regarding any
5 interim measures (IMs) or tank removal activities performed at the site.
- 6 **4.0 Summary of Additional Investigations** – Summarizes information, if any, collected
7 after completion of the *Zone E RFI Report, Revision 0*.
- 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 the necessary
14 corrective action process.
- 15 **8.0 CMS Work Plan for AOC 586** - Provides recommendations for proceeding with the
16 CMS for this site.
- 17 **9.0 References** – Lists the references used in this document.
- 18 **Appendix A** – Contains excerpts from the *Zone E RFI Report, Revision 0*, including a
19 summary of detections of chemicals and a groundwater flow map for the site vicinity.
- 20 **Appendix B** – Contains the UCL₉₅ Percent Estimates for Aroclor-1260 at AOC 586.
- 21 **Appendix C** - Contains CH2M-Jones' Responses to SCDHEC Comments on the *RFI Report*
22 *Addendum, AOC 586, Zone E, Revision 0* (August 2002).
- 23 All tables and figures appear at the end of their respective sections.



AOC 586

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

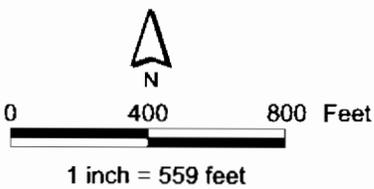
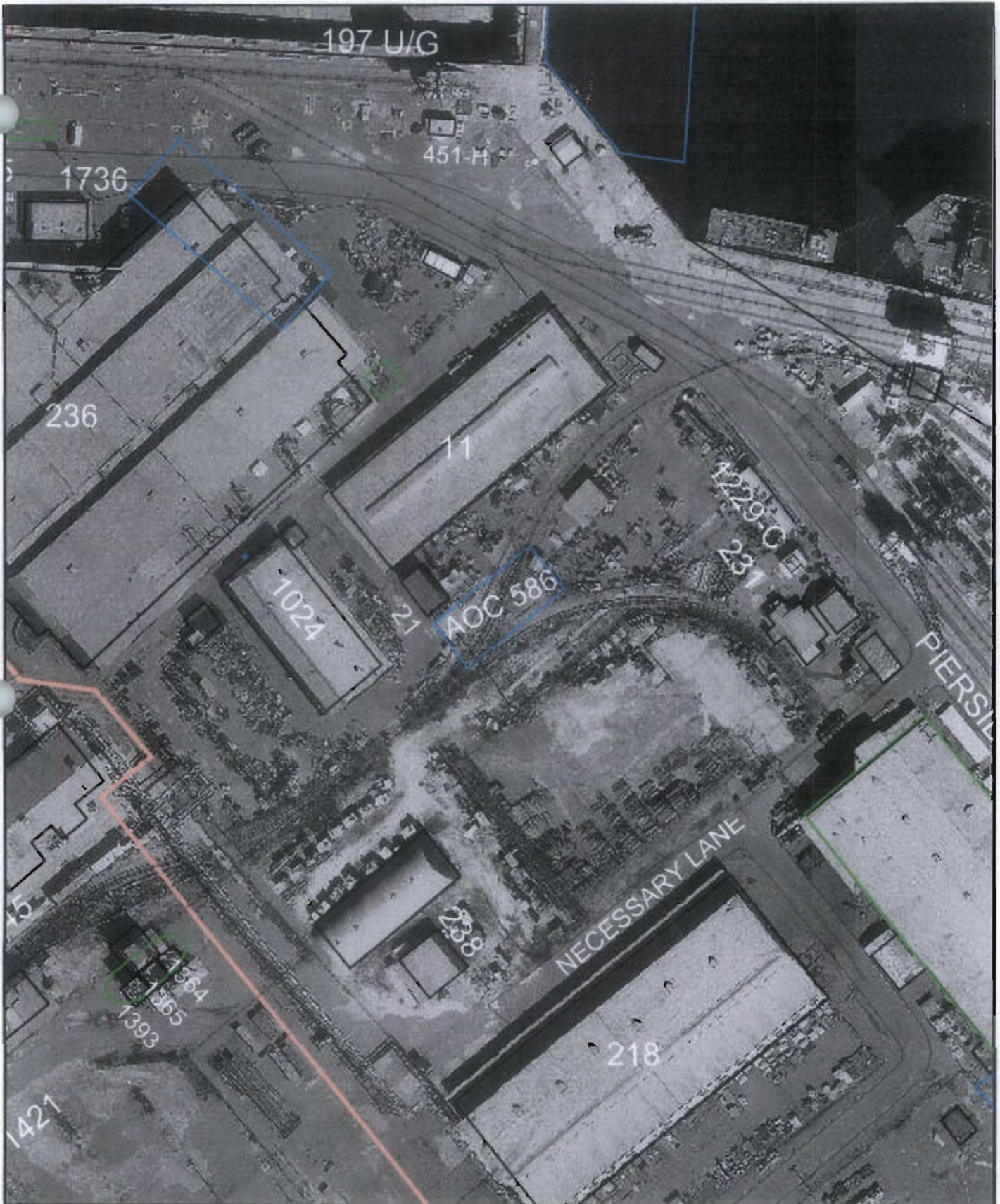


Figure 1-1
Location of AOC 586 in Zone E
Charleston Naval Complex



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

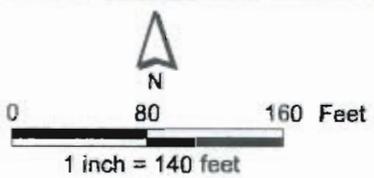


Figure 1-2
Aerial Photograph of AOC 586
AOC 586, Zone E
Charleston Naval Complex

1 **2.0 Summary of RFI Conclusions for AOC 586**

2 This section summarizes the results and conclusions from the RFI conducted at AOC 586
3 which were reported in the *Zone E RFI Report, Revision 0* (EnSafe, 1997). Figure 2-1 shows
4 the soil and groundwater sampling locations.

5 As part of the Zone E RFI, soil and groundwater investigations were conducted at AOC 586
6 during 1995 -1997. The RFI report presented the results of these investigations and
7 conclusions concerning contamination and risk, as summarized in the following sections. A
8 further evaluation of COCs at this combined site is provided in Section 5.0.

9 Appendix A contains a summary of the detected chemicals in soil and groundwater from
10 the *Zone E, RFI Report, Revision 0*.

11 **2.1 Soil Sampling and Analysis**

12 Soil was sampled during one sampling event at AOC 586. Surface and subsurface soil
13 samples were collected beneath the concrete slab and gravel covering AOC 586 from soil
14 sampling locations E586SB001 through E586SB004 (see Figure 2-1). All samples were
15 analyzed for volatile organic compounds (VOCs), semivolatile organic compounds
16 (SVOCs), metals, polychlorinated biphenyl compounds (PCBs), and pH. No field duplicate
17 samples were collected.

18 **2.1.1 Surface Soil Results**

19 During the RFI, surface soil detections of organic compounds were evaluated against the
20 U.S. Environmental Protection Agency (EPA) Region III industrial risk-based
21 concentrations (RBCs) (with a hazard index [HI]=0.1 for noncarcinogens). Surface soil
22 detections of inorganic compounds were evaluated against the EPA Region III industrial
23 RBCs (HI=0.1 for noncarcinogens) and the Zone E background reference concentrations
24 (BRCs).

25 Detected concentrations of organic and inorganic compounds for surface soil samples were
26 as follows:

- 27 • **VOCs:** No VOCs were detected in surface soil at concentrations above the screening
28 criteria.

- 1 • **SVOCs:** Surface soil samples had three detections of benzo[a]pyrene equivalents (BEQs)
2 with a maximum calculated concentration of 0.641 milligrams per kilogram (mg/kg),
3 which was below the EPA Region III industrial RBC for benzo[a]pyrene in surface soil
4 (0.780 mg/kg).
- 5 • **Inorganics:** The surface soil sample collected at sample location E586SB002 had a
6 manganese concentration of 431 mg/kg. The Zone E BRC for manganese in surface soil
7 is 302 mg/kg.
- 8 • **PCBs:** The RFI report stated that the surface soil sample collected at sample location
9 E586SB001 had an Aroclor-1260 concentration of 0.870 mg/kg, which exceeded the EPA
10 Region III industrial RBC for Aroclor-1260 in surface soil in effect during the RFI (0.740
11 mg/kg).

12 **2.1.2 Subsurface Soil Results**

13 During the RFI, subsurface soil detections of organic compounds were compared with
14 generic soil screening levels (SSLs) (using a dilution attenuation factor [DAF]=10).
15 Subsurface soil detections of inorganic compounds were compared with generic SSLs (using
16 a DAF=10) and the Zone E BRCs.

17 Detected concentrations of organic and inorganic compounds from subsurface soil samples
18 were as follows:

- 19 • **VOCs:** VOCs were not detected in subsurface soil samples at concentrations above the
20 screening criteria.
- 21 • **SVOCs:** SVOCs were not detected in subsurface soil samples at concentrations above the
22 screening criteria.
- 23 • **Inorganics:** Inorganics were not detected in subsurface soil samples at concentrations
24 above the screening criteria.
- 25 • **PCBs:** PCBs were not detected in subsurface soil samples at concentrations above the
26 screening criteria.

27 **2.2 Groundwater Sampling and Analysis**

28 Groundwater samples were collected at AOC 586 during four sampling events for
29 inorganics and two sampling events for organics from shallow groundwater monitoring
30 well E586GW001. The sampling location is shown in Figure 2-1. Groundwater samples were

1 analyzed for VOCs, SVOCs, PCBs, metals, pH, chlorides, sulfates, and total dissolved solids
2 (TDS).

3 **2.2.1 Shallow Groundwater Results**

4 During the RFI, detections in shallow groundwater samples were compared with the EPA
5 Region III tap-water RBCs, maximum contaminant levels (MCLs), and for inorganics, the
6 Zone E BRCs for shallow groundwater.

7 Detected concentrations of organic and inorganic compounds for shallow groundwater
8 samples were as follows:

- 9 • **VOCs:** VOCs were not detected in shallow groundwater above laboratory detection
10 limits.
- 11 • **SVOCs:** SVOCs were not detected in shallow groundwater above the screening criteria.
- 12 • **PCBs:** PCBs were not detected in shallowground water above laboratory detection
13 limits.
- 14 • **Inorganics:** Inorganics were not detected in shallow groundwater above the screening
15 criteria.

16 **2.2.2 Deep Groundwater Results**

17 Deep groundwater samples were not collected at AOC 586.

18 **2.3 RFI Human Health Risk Assessment (HHRA)**

19 The *Zone E RFI Report, Revision 0* used a fixed-point risk evaluation (FRE) approach at this
20 site. The FRE considered site resident and site worker scenarios during the FRE. The
21 detailed risk assessment for AOC 586 is presented in Section 10.42.6 of the *Zone E RFI*
22 *Report, Revision 0*.

23 **2.3.1 Soils**

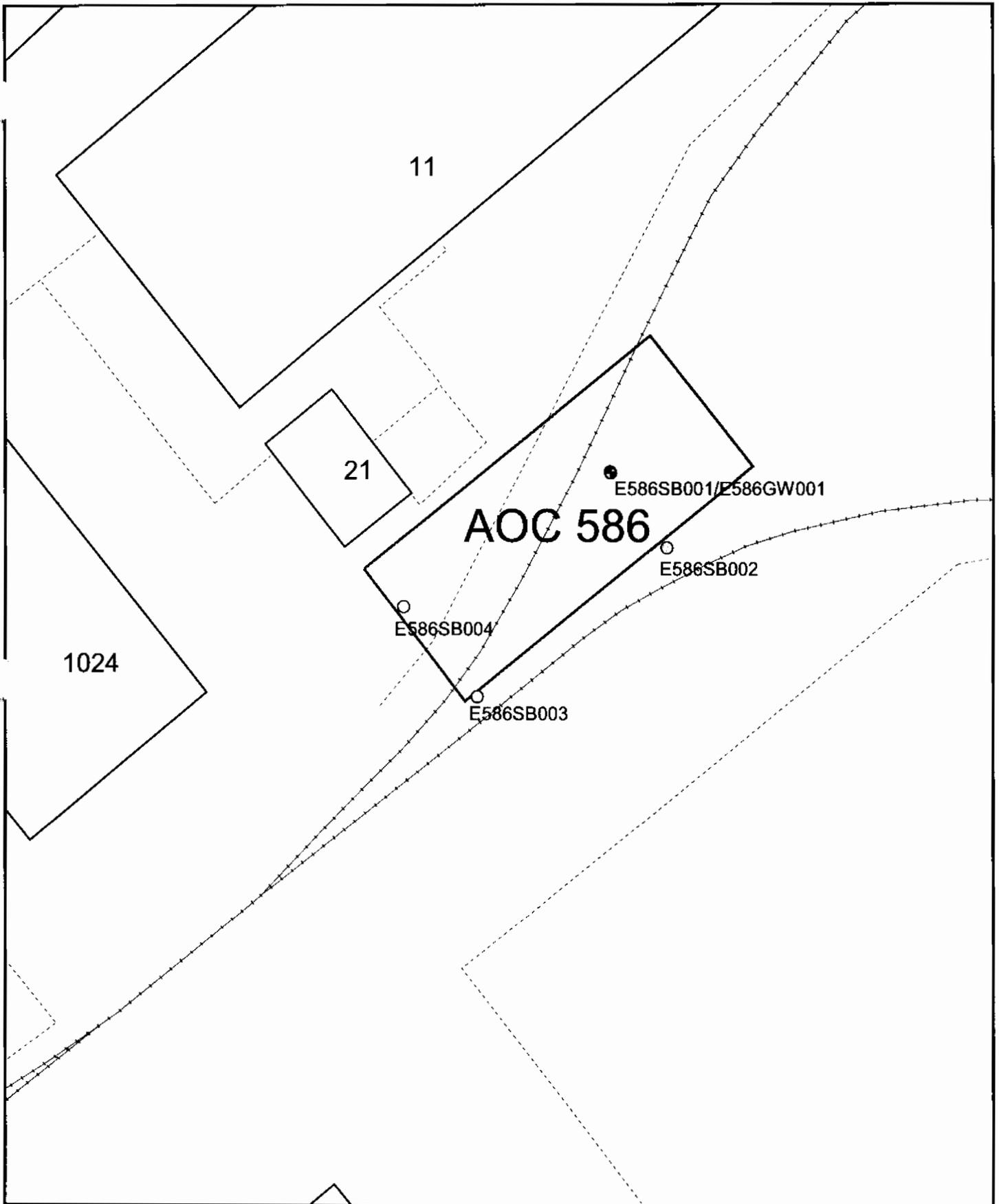
24 The HHRA for AOC 586 identified Aroclor-1260, BEQs, and manganese as COCs in surface
25 soil for an unrestricted (i.e., residential) land use scenario. No COCs were identified in
26 subsurface soil.

27 **2.3.2 Groundwater**

28 The HHRA for AOC 586 did not identify any COCs for shallow groundwater. Deep
29 groundwater was not sampled.

1 **2.4 RFI Conclusions and Recommendations**

- 2 The *Zone E RFI Report, Revision 0* concluded that based on the analytical results and the FRE,
3 a Corrective Measures Study (CMS) should be conducted for the COCs identified in surface
4 soil at AOC 586 (Aroclor-1260, BEQs, and manganese). The RFI report recommended No
5 Further Action (NFA) status for groundwater at AOC 586.



- Groundwater Well
- Soil Sample
- - - Fence
- - - Railroads
- ▭ AOC Boundary
- ▭ SWMU Boundary
- ▭ Buildings

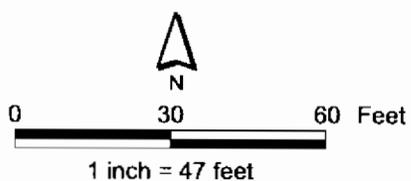


Figure 2-1
RFI Sample Locations
AOC 586, Zone E
Charleston Naval Complex

Section 3.0

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

2 **3.1 UST/AST Removals**

3 There is no indication of an underground storage tank (UST) or aboveground storage tank
4 (AST) being present at AOC 586.

5 **3.2 Interim Measures**

6 There were no interim measures (IMs) conducted at AOC 586.

1 **4.0 Summary of Additional Investigations**

- 2 No additional investigations have been conducted at AOC 586 since the RFI was completed
- 3 by the Navy/EnSafe team during 1995-1997.

1 **5.0 COPC/COC Refinement**

2 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified Aroclor-1260, BEQs, and
3 manganese as surface soil COCs at AOC 586. Detected concentrations of site constituents
4 were compared to current screening criteria adopted by the BCT for the CNC project. These
5 chemicals are re-evaluated in this section to determine if they should be considered COCs.

6 The BCT has agreed that soil VOC data will be re-screened against generic SSLs, using a
7 DAF=1. Two VOCs, acetone and carbon disulfide, were detected in the surface and
8 subsurface soil samples from soil boring E562SB001. These detections are presented in Table
9 5-1, which also presents their respective SSLs based on a DAF=1. The data indicate that the
10 detected VOCs do not exceed the SSL screening criteria.

11 **5.1 Surface Soil**

12 **5.1.1 BEQs**

13 The RFI report identified BEQs as a COC based on two detections above the EPA Region III
14 residential RBC for benzo[a]pyrene of 0.780 mg/kg. These detections were found in surface
15 soil samples collected at sample locations E586SB001 and E586SB003, with BEQ
16 concentrations of 0.810 mg/kg and 1.085 mg/kg, respectively. These values are below the
17 CNC BEQ site-wide reference concentration in surface soil of 1.304 mg/kg. There were no
18 BEQ exceedances of screening criteria in subsurface soil samples from AOC 586. Therefore,
19 BEQs are not considered a COC at AOC 586.

20 **5.1.2 Aroclor-1260**

21 The RFI report identified Aroclor-1260 as a COC based on an exceedance of the EPA Region
22 III industrial RBC of 0.740 mg/kg in the sample from E586SB001, which had an Aroclor-
23 1260 concentration of 0.87 mg/kg. Based on the more recent value for the industrial RBC of
24 2.9 mg/kg (EPA 2000), none of the Aroclor-1260 detections exceed the industrial RBC. This
25 detection of 0.87 mg/kg exceeds the EPA Region III residential RBC for Aroclor-1260 of 0.32
26 mg/kg.

27 A 95-percent Upper Confidence Limit (UCL₉₅) estimation indicated lognormal distribution
28 for the data. However, due to the small sample size, the result was a UCL₉₅ estimate greater
29 than the maximum concentration, and thus defaulted to the maximum concentration. A
30 summary of these UCL₉₅ calculations is presented in Appendix B.

1 A UCL₉₅ estimate based on the bootstrap method resulted in a value of 0.57 mg/kg, which
2 is also above the EPA Region III residential RBC value, but below the industrial RBC value.
3 Overall concentrations did not exceed the target action level of 1 mg/kg established by the
4 EPA for high occupancy areas (EPA, 2001). There were no detections of Aroclor-1260 in the
5 subsurface soil sample at this location.

6 The site is located within a highly industrialized area of Zone E. The detected
7 concentrations of PCBs are below the industrial worker protection-based RBC, and well
8 below the target action level of 1 mg/kg, although the detections slightly exceeded the
9 residential land use-based RBC. Therefore, Aroclor-1260 is not considered as a COC for
10 surface soils for the industrial land use scenario. However, based on the surface soil
11 detection at E586SB001 exceeding the residential RBC, Aroclor-1260 is identified as a COC
12 for surface soil for the unrestricted land use scenario at AOC 586.

13 **5.1.3 Manganese**

14 The RFI report identified manganese in surface soil as a COC based on a detection in the
15 surface soil sample from E586SB002 of 431 mg/kg, which is above the EPA Region III
16 residential RBC of 160 mg/kg (HI=0.1). This detection is below the Zone E maximum
17 background manganese concentration of 508 mg/kg, indicating that manganese detections
18 at this site are due to natural occurrence and not site-related. Therefore manganese is not
19 considered a COC at AOC 586.

20 **5.2 COC Summary**

21 Aroclor-1260 is identified as a COC for surface soil based on the unrestricted land use
22 scenario. Accordingly, LUCs should be applied at this site in order to preclude the use of
23 the site for residential purposes.

24 Based on this evaluation, the site is recommended for continued and future industrial land
25 use. Such use is appropriate given the location of these facilities within the heavily
26 industrialized portion of the CNC, and is consistent with previous BCT agreements
27 regarding RCRA investigation and assessment processes.

28 A focused CMS is recommended for this site to evaluate LUCs as a presumptive remedy.
29 Should a future property owner decide to use the property for unrestricted land use, the
30 future owner may make a demonstration that the property is suitable for the proposed use
31 or perform the necessary additional investigations and remediation, as necessary for that
32 proposed use.

33 No other COCs were identified in surface soil, subsurface soil, or groundwater for the
34 unrestricted or industrial land use scenarios at AOC 586.

TABLE 5-1
 Detected Concentrations of VOCs Methyl Ethyl Ketone, Carbon Disulfide, and Carbon Tetrachloride in Soil
 RFI Report Addendum, AOC 586, 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.
Methyl Ethyl Ketone								
Surface Soil								
	E586SB003	E586SB00301	0.004	J	10/16/95	4,700	NA	NA
Subsurface Soil								
	E586SB001	E586SB00102	0.003	J	10/16/95	4,700	NA	NA
Carbon Disulfide								
Subsurface Soil								
	E586SB003	E586SB00302	0.003	J	10/16/95	780	2	NA
Carbon Tetrachloride								
Subsurface Soil								
	E586SB003	586SB00302	0.002	J	12/05/1995	44	0.003	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.

NA Not applicable

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

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 586. In accordance with the RFI completion process, if a
6 determination of No Further Investigation (NFI) is made upon completion of the RFI, then a
7 site may proceed to either NFA status or to a CMS. Evaluation of the RFI data for AOC 586
8 identified Aroclor-1260 as a COC for surface soil based on the unrestricted scenario. The
9 remaining subsections address the issues that the BCT agreed to evaluate prior to site
10 closeout. Although a No Further Action (NFA) designation is not being requested, these
11 issues are presented to facilitate decision-making at the site.

12 **6.2 Presence of Inorganics in Groundwater**

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

17 There were no detections of arsenic in shallow groundwater at the site above the arsenic
18 MCL. There were no detections of thallium or antimony in shallow groundwater above
19 laboratory detection limits at AOC 586. Therefore, further evaluation of this issue is not
20 warranted.

21 **6.3 Potential Linkage to SWMU 37, Investigated Sanitary** 22 **Sewers at the CNC**

23 There are no data suggesting that there was an impact to the sanitary sewers from this site.
24 Therefore, further evaluation of this issue is not warranted.

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

3 No direct connection from AOC 586 to the storm sewers is known to exist. 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 A railroad line runs through the middle of the site. There are no data indicating impacts to
8 the site from the railroad line and no connection is established between the site and the
9 investigated railroad lines in Zone E. Therefore, further investigation of this issue is not
10 warranted.

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

13 The nearest surface water body to AOC 586 is the Cooper River, which lies approximately
14 285 feet northeast of the site. The only potential migration pathway from the site to surface
15 water is by overland flow from stormwater runoff. AOC 586 is covered by concrete and
16 gravel, which limits contact of surface soil with stormwater. No further evaluation of a
17 potential pathway for contaminant migration via stormwater runoff is warranted.

18 **6.7 Potential Contamination in Oil/Water Separators (OWSs)**

19 There are no OWSs associated with AOC 586. In addition, there is no reference to an OWS
20 at the site in the *Oil Water Separator Data* report, Department of the Navy, September 2000.
21 Therefore, further evaluation of this issue is not warranted.

22 **6.8 Land Use Controls (LUCs)**

23 Aroclor-1260 has been identified as a surface soil COC for the unrestricted land use scenario
24 at AOC 586, based on one exceedance of the residential RBC. The Navy/CH2M-Jones team
25 is proposing that this site be used only for industrial land use. LUCs restricting the land use
26 to industrial will be implemented by the BCT. The LUC issue will be addressed in the CMS
27 Work Plan and CMS Report for AOC 586.

1 **7.0 Recommendations**

2 Aroclor-1260 was identified as a COC in surface soils for the unrestricted (i.e., residential)
3 land use scenario at AOC 586. Accordingly, LUCs should be applied at this site in order to
4 preclude use of the site for residential purposes. No other COCs were identified for
5 subsurface soil or groundwater for the unrestricted land use scenario. No COCs were
6 identified in soil or groundwater for the industrial land use scenario.

7 A focused CMS is recommended for this site to evaluate potential remedies. Section 8.0
8 presents a focused CMS Work Plan for AOC 586. Should a future property owner decide to
9 use the property for unrestricted land use, the future owner may make a demonstration that
10 the property is suitable for the proposed use or perform the necessary additional
11 investigations and remediation, as necessary, for that proposed use.

1 **8.0 CMS Work Plan for AOC 586**

2 Aroclor-1260 was identified as a COC in surface soil for the unrestricted (i.e., residential)
3 land use scenario at AOC 586. Only one soil boring location, E586SB001, had an Aroclor-
4 1260 detection at 0.87 mg/kg, which exceeds the EPA Region III residential RBC of 0.32
5 mg/kg. It is feasible that in the future, should site conditions change, some exposure could
6 occur. Therefore, a CMS should be conducted to evaluate potential corrective measures and
7 identify an appropriate remedy for the site.

8 This section presents a focused CMS Work Plan. Media cleanup standards (MCSs) are
9 identified for COCs, and potential remedies that should be evaluated are also presented.

10 **8.1 Remedial Action Objectives**

11 Remedial action objectives (RAOs) are medium-specific goals that the remedial actions are
12 designed to accomplish in order to protect human health and the environment by
13 preventing or reducing exposures under current and future land use conditions. The RAOs
14 identified for the surface soil at AOC 586 are being chosen to prevent ingestion and
15 direct/dermal contact with surface soil containing COCs at unacceptable levels. No
16 remedial actions are required for subsurface soil or groundwater at AOC 586.

17 **8.2 Remedial Goal Options and Media Cleanup Standards**

18 Throughout the process of remediating a hazardous waste site, a risk manager uses a
19 progression of increasingly acceptable site-specific media levels in considering remedial
20 alternatives. Under the RCRA program, remedial goal options (RGOs) and MCSs are
21 developed at the end of the risk assessment in the RFI/Remedial Investigation (RI)
22 programs, before completion of the CMS.

23 RGOs can be based on a variety of criteria, such as specific incremental lifetime cancer risk
24 (ILCR) levels (e.g., 1E-04, 1E-05, or 1E-06), HI levels (e.g., 0.1, 1.0, 3.0), or site background
25 concentrations. For a particular RGO, specific MCSs can be determined as target
26 concentration values. Achieving these MCSs is accepted as demonstrating that RGOs and
27 RAOs have been achieved. Achieving these goals should promote the protection of human
28 health and the environment, while achieving compliance with applicable state and federal
29 standards.

1 The exposure medium of concern for AOC 586 is surface soil impacted by Aroclor-1260.
2 Because Aroclor-1260 is located within a highly developed area of the CNC and there are no
3 surface water bodies in the immediate vicinity of the site, ecological exposures were not
4 considered applicable for evaluation.

5 For Aroclor-1260 within Zone E, the MCS is the EPA Region III residential RBC of 0.32
6 mg/kg for unrestricted land use. A MCS will be met if the site statistical estimates of
7 concentrations are below the target MCS.

8 **8.3 Potential Remedies to Evaluate**

9 Because of the small size of this site and the relatively small quantity of impacted surface
10 soil, the list of practicable remedial alternatives for this site is limited. Because this area of
11 Zone E is currently heavily industrialized, and industrial use is expected to continue in all
12 of Zone E, only LUCs are being considered as a presumptive remedy to be evaluated as part
13 of the CMS.

14 **8.4 Focused CMS Approach**

15 The focused CMS will consist of the following tasks that will be performed in the order
16 presented below:

- 17 1. The corrective measure alternative described above will be screened using several
18 criteria and decision factors.
- 19 2. The CMS and preferred corrective measure alternative will be documented in the CMS
20 report.

21 **8.5 Approach to Evaluating Corrective Measure Alternatives**

22 According to the RCRA permit issued by SCDHEC (SCDHEC, 1998), the alternatives will be
23 evaluated with the following five standards:

- 24 1. Protecting human health and the environment.
- 25 2. Attaining media cleanup standards (RGOs).
- 26 3. Controlling the source of releases to minimize future releases that may pose a threat to
27 human health and the environment.
- 28 4. Complying with applicable standards for the management of wastes generated by
29 remedial activities.

1 5. Other factors include (a) long-term reliability and effectiveness; (b) reduction in toxicity,
2 mobility, or volume of wastes; (c) short-term effectiveness; (d) implementability; and
3 (e) cost.

4 Each of the five criteria is defined in more detail below:

5 1. **Protecting human health and the environment.** The alternatives will be evaluated on
6 the basis of their ability to protect human health and the environment. The ability of an
7 alternative to achieve this criterion may or may not be independent of its ability to
8 achieve the other four standards. For example, an alternative may be protective of
9 human health, but may not be able to attain the MCSs if the MCSs are not directly tied
10 to protecting human health.

11 2. **Attaining media cleanup standards (RGOs).** The alternatives will be evaluated on the
12 basis of their ability to achieve the RGOs defined in this CMS Work Plan. Another
13 aspect of this criterion is the timeframe to achieve the RGOs. Estimates of the timeframe
14 for the alternatives to achieve RGOs will be provided.

15 3. **Controlling the source of releases.** This criterion deals with the control of releases of
16 contamination from the source (the area in which the contamination originated).

17 4. **Complying with applicable standards for management of wastes.** This criterion deals
18 with the management of wastes derived from implementing the alternatives, for
19 example, treatment or disposal of excavated material. The soil removal alternative will
20 be designed to comply with all applicable standards for management of remediation
21 wastes. Consequently, this criterion will not be explicitly included in the detailed
22 evaluation presented in the CMS but will be part of a work plan specific to the removal
23 action should a removal action become the chosen alternative.

24 5. **Other factors.** Five other factors are to be considered if an alternative is found to meet
25 the four criteria described above. These other factors are as follows:

26 a. Long-term reliability and effectiveness

27 The two alternatives will be evaluated on the basis of their reliability, and the
28 potential impact should the chosen alternative fail. In other words, a qualitative
29 assessment will be made as to the chance of the alternative's failure and the
30 consequences of that failure.

31 b. Reduction in the toxicity, mobility, or volume of wastes

1 Alternatives with technologies that reduce the toxicity, mobility, or volume of the
2 contamination will be generally favored over those that do not. Consequently, a
3 qualitative assessment of this factor will be performed for each alternative.

4 c. Short-term effectiveness

5 Alternatives will be evaluated on the basis of the risk they create during the
6 implementation of the remedy. Factors that may be considered include fire,
7 explosion, and exposure of workers to hazardous substances.

8 d. Implementability

9 The alternatives will be evaluated for their implementability by considering any
10 difficulties associated with conducting the alternatives (such as the construction
11 disturbances they may create), operation of the alternatives, and the availability of
12 equipment and resources to implement the technologies comprising the alternatives.

13 e. Cost

14 A net present value of each alternative will be developed. These cost estimates will
15 be used for the relative evaluation of the alternatives, not to bid or budget the work.
16 The estimates will be based on information available at the time of the CMS and on a
17 conceptual design of the alternative. They will be "order-of-magnitude" estimates
18 with a generally expected accuracy of -50 percent to +50 percent for the scope of
19 action described for each alternative. The estimates will be categorized into capital
20 costs and operations and maintenance costs for each alternative.

21 In addition to the criteria described above, the alternative will be evaluated for its ability to
22 achieve all contractual obligations of CH2M-Jones and the Navy.

23 **8.6 Focused CMS Report**

24 A focused CMS Report will be prepared to present the identification, development, and
25 evaluation of the potential corrective measure for AOC 586. A proposed outline of the
26 report, as shown in Table 8-1, provides an example of the report format and content.

TABLE 8-1
 Outline of Focused CMS Report for AOC 586
RFI Report Addendum and CMS Work Plan, AOC 586, Zone E, Charleston Naval Complex

Section No.	Section Title
1.0	Introduction
1.1	Corrective Measures Study Purpose and Scope
1.2	Report Organization
1.3	Background Information
1.3.1	Facility Description
1.3.2	Site History and Background
1.3.2.1	Nature and Extent of Contamination
1.3.2.2	Summary of Risk Assessment
2.0	Remedial Goal Objectives
3.0	Detailed Analysis of Focused Alternative
3.1	Approach
3.2	Evaluation Criteria
3.3	Description of Alternative
3.3.1	Alternative 1: Land Use Controls
3.4	Detailed Analysis of Alternative 1
4.0	Recommended Remedial Alternative
5.0	References
Appendix A	Corrective Measure Alternative Cost Estimate^b
	List of Tables
	List of Figures

^a Additional alternatives will be analyzed as found necessary.

^b Additional appendices will be added, if necessary.

1 9.0 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*.
- 11 U.S. Environmental Protection Agency. *Region III RBC Tables*. October 2000.
- 12 U.S. Environmental Protection Agency. *Code of Federal Regulations, 40 CFR 761.61.4*
13 *Subchapter R – Toxic Substances Control Act, Part 761, PCB Remediation Waste*. February 2001.

Appendix A

Table 10.42.6.1
 Chemicals Present in Site Samples
 AOC 586 - Surface Soil
 NAVBASE - Charleston
 Charleston, South Carolina

Parameter	Frequency of Detection		Range of Detection		Average Detected Conc.	Range of SQL		Screening Concentrations			Units	Number Exceeding		
								Residential RBC	Industrial RBC	Reference		Res.	Ind.	Ref.
PCBs														
Aroclor-1260	*	3	4	110	870	373	94	94	83	740	NA	UG/KG	3	1
Carcinogenic PAHs														
B(a)P Equiv.	*	3	4	0.14	641.36	347	2149.23	2149.23	88	780	NA	UG/KG	2	
Benzo(a)anthracene		2	4	170	380	275	930	940	880	7800	NA	UG/KG		
Benzo(b)fluoranthene		2	4	460	590	525	930	940	880	7800	NA	UG/KG		
Chrysene		3	4	140	460	303	930	930	88000	780000	NA	UG/KG		
Dibenz(a,h)anthracene	*	1	4	94	94	94	820	940	88	780	NA	UG/KG	1	
Indeno(1,2,3-cd)pyrene		2	4	240	260	250	930	940	880	7800	NA	UG/KG		
Benzo(k)fluoranthene		2	4	330	390	360	930	940	8800	78000	NA	UG/KG		
Benzo(a)pyrene	*	2	4	310	420	365	930	940	88	780	NA	UG/KG	2	
Inorganics														
Aluminum (Al)		4	4	6400	11700	7973	NA	NA	7800	100000	26600	MG/KG	1	
Antimony (Sb)		2	4	1.3	1.8	1.55	0.61	0.76	3.1	82	1.77	MG/KG		1
Arsenic (As)		4	4	7.9	23.3	14.6	NA	NA	0.43	3.8	23.9	MG/KG	4	4
Barium (Ba)		4	4	22	35.8	28.9	NA	NA	550	14000	130	MG/KG		
Beryllium (Be)		4	4	0.63	0.96	0.75	NA	NA	0.15	1.3	1.7	MG/KG	4	
Cadmium (Cd)		3	4	0.34	0.8	0.5	0.19	0.19	3.9	100	1.5	MG/KG		
Calcium (Ca)	N	4	4	18100	85400	62225	NA	NA	NA	NA	NA	MG/KG		
Chromium (Cr)		4	4	25.8	32.9	28.85	NA	NA	39	1000	94.6	MG/KG		
Cobalt (Co)		4	4	3.2	13.4	6.45	NA	NA	470	12000	19	MG/KG		
Copper (Cu)		4	4	16.5	104	46.2	NA	NA	310	8200	66	MG/KG		1
Iron (Fe)	N	4	4	8440	22500	12655	NA	NA	NA	NA	NA	MG/KG		
Lead (Pb)		4	4	19.1	132	61.9	NA	NA	400	1300	265	MG/KG		
Magnesium (Mg)	N	4	4	3790	4220	3948	NA	NA	NA	NA	NA	MG/KG		
Manganese (Mn)	*	4	4	140	431	240.5	NA	NA	180	4700	302	MG/KG	3	1
Mercury (Hg)		4	4	0.06	0.3	0.17	NA	NA	2.3	61	2.6	MG/KG		
Nickel (Ni)		4	4	9.5	15.2	12.85	NA	NA	160	4100	77.1	MG/KG		
Potassium (K)	N	4	4	1230	2430	1688	NA	NA	NA	NA	NA	MG/KG		
Selenium (Se)		4	4	1	1.2	1.1	NA	NA	39	1000	1.7	MG/KG		
Sodium (Na)	N	4	4	305	929	660	NA	NA	NA	NA	NA	MG/KG		
Thallium (Tl)		4	4	0.87	1.7	1.10	NA	NA	0.63	16	2.8	MG/KG	4	
Tin (Sn)		1	4	4.8	4.8	4.8	2.8	3.8	4700	6100	59.4	MG/KG		
Vanadium (V)		4	4	19.2	48.5	27.5	NA	NA	55	1400	94.3	MG/KG		
Zinc (Zn)		4	4	73.6	178	114.6	NA	NA	2300	61000	827	MG/KG		
Semivolatile Organics														
Benzo(g,h,i)perylene		2	4	280	310	295	930	940	310000	8200000	NA	UG/KG		
Fluoranthene		2	4	170	600	385	930	940	310000	8200000	NA	UG/KG		
Phenanthrene		1	4	210	210	210	820	940	310000	8200000	NA	UG/KG		
Pyrene		3	4	170	660	360	930	930	230000	6100000	NA	UG/KG		
Volatile Organics														
2-Butanone (MEK)		1	4	4	4	4	12	35	4700000	100000000	NA	UG/KG		

* - Identified as a residential COPC
 ** - Identified as an industrial COPC
 N - Essential nutrient
 MG/KG - milligram per kilogram
 UG/KG - microgram per kilogram
 SQL - Sample quantitation limit
 RBC - Risk-based concentration
 NA - Not Applicable

Table 10.42.6.3
Point Estimates of Risk and Hazard - Surface Soil Pathways
Industrial Scenario
AOC 586
NAVBASE-Charleston
Charleston, South Carolina

Site	Location	Parameter	Concentration	Units	Hazard Index	% HI	Risk (E-06)	% Risk
586	B001	Aroclor-1260	870.00	UG/KG	NA		0.8026	100.00
		Total			NA		0.8026	
586	B002	Aroclor-1260	110.00	UG/KG	NA		0.1015	100.00
		Total			NA		0.1015	
586	B003	Aroclor-1260	140.00	UG/KG	NA		0.1292	100.00
		Total			NA		0.1292	
586	B004	Aroclor-1260	ND	UG/KG	NA		NA	
		Total			NA		NA	

Table 10.42.6.4
 Chemicals Present in Site Samples
 AOC 586 - Shallow Groundwater
 NAVBASE - Charleston
 Charleston, South Carolina

Parameter	Frequency of Detection		Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration Residential RBC Reference		Units	Number Exceeding RBC Ref.	
Inorganics												
Aluminum (Al)	1	1	157	157	157	NA	NA	3700	2810	UG/L		
Arsenic (As)	1	1	11.4	11.4	11.4	NA	NA	0.045	18.7	UG/L	1	
Semivolatile Organics												
Naphthalene	1	1	5	5	5	NA	NA	150	NA	UG/L		

* - Identified as a COPC
 UG/L - micrograms per kilogram
 SQL - Sample quantitation limit
 RBC - Risk-based concentration
 NA - Not applicable



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

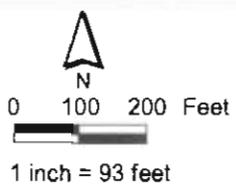


Figure A-1
 Shallow Groundwater Contour Map
 AOC 586, Zone E
 Charleston Naval Complex

Appendix B

Site: AOC 586
 Media: surface soil
 Units: ug/kg
 Chemical: Aroclor-1260
 CASRN:

STATISTICS

N	4
Detects	3
FOD	75%
Mean of Detect	373.333
Min of Detect	110.0000
Max of Detect	870.00
Best Estimate of Mean (arithmetic)	569.6
Best Estimate of Mean (geometric)	158.4
Nondetects at 1/2 DL	YES

95% UPPER CONFIDENCE LIMITS FOR MEAN

UCL95 Normal	747.6
<i>t</i> -statistic	2.35
UCL95 Lognormal	195977.4 Exceeds Max Detect
<i>H</i> -statistic	8.98
UCL95 Nonparametric	#VALUE!
UCL95 Bootstrap	569.57

95% UPPER TOLERANCE INTERVAL

UTL95 Normal	1311.010047
<i>coverage</i>	95%
UTL95 Lognormal	4009.447587
<i>coverage</i>	95%
UTL95 Nonparametric	870.00
<i>coverage</i>	80%

DISTRIBUTION TESTING

Population is best described as:	LOGNORMAL
W_{normal}	0.723
W_{log}	0.925
$W_{\alpha=0.05}$	0.748

Notes:

1. If population does not fit normal or lognormal distribution, check Q-Q plots and W-test values. The population may be close enough to one of those distributions to subjectively select a normal or lognormal distribution.
2. For site data, if the selected UCL95 exceeds the Max Detect, the Max Detect should be chosen as the EPC.
3. Lognormal UCL or UTL values calculated for less than 30 samples may be widely inflated.
4. If there is >90% nondetection, it is generally impossible to calculate a UTL or UCL with any level of confidence.

CH2MHILL TRANSMITTAL

To: Jerry Stamps
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste
Management
2600 Bull Street
Columbia, SC 29201

From: Dean Williamson/CH2M-Jones

Date: November 14, 2002

Re: CH2M-Jones' Responses to Comments by SCDHEC regarding the *RFI Report Addendum, Area of Concern 586, Zone E, Charleston Naval Complex (Revision 0)*

Quantity	Description
4	CH2M-Jones' Responses to Comments by SCDHEC regarding the <i>RFI Report Addendum, Area of Concern 586, Zone E, Charleston Naval Complex (Revision 0)</i> – Originally Submitted on August 26, 2002

If material received is not as listed, please notify us at once

Remarks:

Copy To:

Paul Bergstrand/SCDHEC, w/att
Susan Byrd/SCDHEC, w/att
BCT Distribution List

Engineering Comments Prepared by Jerry Stamps

1. Sections 5.1.2, Aroclor 1260.

Aroclor 1260 was detected at sample E586SB001 at a concentration of 0.870 mg/kg. This sample exceeds the EPA Region III Industrial and Residential RBC of 0.740 mg/kg and 0.320 mg/kg, respectively. The following is a list of concerns relating to the elevated detection of Aroclor 1260:

- a. A UCL₉₅ was calculated but according to the text, the UCL₉₅ was determined to be higher than the maximum concentration; therefore, the Navy defaulted to the maximum concentration. This does not appear to be the case as the second paragraph goes on to compare the UCL₉₅ based upon a bootstrap method to the industrial RBC. Please correct the inconsistency.
- b. Please see Susan Byrd's comment pertaining to the calculation of a UCL₉₅ based upon such a limited data set.
- c. The Navy must collect additional soil samples to delineate the extent of the PCB contamination. The additional data should allow for the appropriate calculation a UCL₉₅ to evaluate the risk posed by the existing contamination.
- d. The Department maintains that the use of the 1 mg/kg action level established under TSCA for high occupancy areas is only appropriate once the risk has been characterized. The Navy must evaluate the risk posed by the PCB detections. Once the risk has been characterized, the above referenced action level may used to make a risk management decision, as appropriate.

CH2M-Jones Response:

During review of this comment, CH2M-Jones noted that the value for the EPA Region III industrial RBC provided in Section 5.1.2 for Aroclor 1260 (0.74 mg/kg) is not the correct current EPA Region III industrial RBC. Inspection of the October 2000 EPA Region III RBC tables, as provided in the CNC Project Notebook, shows the actual industrial RBC for Aroclor 1260 is 2.9 mg/kg.

The value of 0.74 mg/kg, which was reported as the industrial RBC in the Revision 0 RFI Report Addendum for AOC 586 was incorrectly taken from Table 10.42.6.1 of the Revision 0 Zone E RFI Report (a copy of this table is provided in Appendix A of the Revision 0 RFI Report Addendum for AOC 586). This value was used by the Navy/EnSafe team as its COPC screening value for this chemical.

Using the correct industrial RBC of 2.9 mg/kg as the appropriate COPC screening criteria shows that all reported detections of Aroclor 1260 in soil at AOC 586 are below this value. Consequently, Aroclor 1260 is not considered a COPC or COC for the industrial land use scenario. The text of section 5.0 will be revised to reflect this information.

Response to Comment 1A: A clearer discussion of the UCL₉₅ calculation will be provided.

Response to Comment 1B: A response to Susan Byrd's comment is also provided herewith.

Response to Comment 1C: The BCT has agreed that delineation of contaminants to industrial RBCs is all that is required in Zone E. Because there are no exceedances of the industrial RBC for Aroclor 1260, as explained above, no additional sampling is required.

Response to Comment 1D: We agree. This issue is relevant to discussions regarding whether Aroclor 1260 would be a COC for residential land use.

2. Section 6.8, Land Use Controls (LUCs).

This section states that no COCs have been identified at AOC 586. However, Aroclor 1260 should be maintained as a COPC since it exceeds the residential and industrial RBCs. LUCs may be applicable for AOC 586 contingent upon the results of the additional soil samples and resulting risk analysis.

CH2M-Jones Response:

As explained above, Aroclor 1260 would not be a COC for industrial land use because no samples exceeded the industrial RBC of 2.9 mg/kg. We agree that Aroclor 1260 could be considered a residential COC for surface soil, and that land use controls would be an effective remedy to preclude potential exposure in this industrial area of the CNC. However, we do not believe that the data suggest any additional characterization is needed at this site.

3. Section 7.0, Recommendations.

This section states that "...no COCs were identified for the unrestricted future land use scenario." The Department does not agree with this conclusion on the basis that Aroclor 1260 exceeds both the residential and industrial RBCs. Please see comment 1d pertaining to the appropriate use of the TSCA action level. Consequently, a No Further Action (NFA) is not appropriate for AOC 586 at this time.

CH2M-Jones Response:

There are several methods for calculating the exposure point concentration. Depending on the method used, Aroclor 1260 could or could not be considered a COC for unrestricted land use. Even if it is considered a COC for unrestricted land use, because all reported detections are below 1 mg/kg, a risk management decision could be made to consider it not to be a COC.

We do not object to the Department considering Aroclor 1260 a COC for surface soil for unrestricted land use and, under that scenario, are agreeable to changing the recommendation for this site to a recommendation for land use controls as a presumptive remedy. Because this area is in a highly industrialized portion of the CNC and zoned for future industrial land use, such an approach is consistent with previous BCT decisions about addressing Zone E sites.

Hydrogeology Comments Prepared by Paul Bergstrand

Specific Comments

1. Page 2-2, Section 2.2.

This section states "Groundwater samples were collected at AOC 586 during four sampling events for inorganics and two sampling events for organics from shallow groundwater monitoring well E586GW001." While this may be technically correct this section fails to point out that groundwater was only sampled once for VOCs and twice for SVOCs during the four sampling events at AOC 586. AOC 586 is described as a temporary powerhouse with a battery shop which was later used for industrial salvage. The Zone E RFI Workplan proposed four rounds of groundwater VOC and SVOC sampling and analysis. The proposed sampling would be appropriate for an industrial salvage site. Apparently a decision, however, was made to limit groundwater VOC analysis to only one sampling event and SVOC analysis to two events. The Final Comprehensive Project Management Plan, dated July 1996, outlines a process to document the reduction of analytical parameters. The documentation supporting the reduction of analytical parameters has not been provided.

It should be noted that the Ensafe Draft RFI report did not provide any indication that groundwater analysis of VOCs and SVOCs had been limited or the documentation of the reduction of analytical parameters as described above. The documentation regarding the reduction of groundwater analytical parameters must be provided and discussed in the revised RFI Report.

CH2M-Jones Response:

An attempt will be made to provide a summary of how the decision to reduce the level of sampling as compared with that proposed in the work plan and provide that information to SCDHEC.

2. Appendix A, Figure A-1.

This figure represents the shallow groundwater contour map from groundwater elevations taken in March 2002. The figure indicates the groundwater contours are drawn in feet below land surface. A telephone conversation with Mr. Tom Beisel on 4 October 2002 confirmed the groundwater contours were drawn in feet mean sea level. This figure should be corrected in a revised RFI Report.

CH2M-Jones Response:

The legend on the Figure A-1 will be revised to indicate "msl" rather than "bls."

Necessary Actions

This is a brief summary of necessary actions for the Navy to conclude the RFI Report Addendum. The numbers correspond the comments. The Department will reevaluate all information in the revised RFI Report.

1. The documentation regarding the reduction of groundwater analytical parameters must be provided and discussed in the revised RFI Report.
2. The figure representing the shallow groundwater contours must be drawn in feet mean sea level in the revised RFI Report.

CH2M-Jones Response:

See above responses.

Risk Assessment Comment Prepared by Susan Byrd

In Section 5.0, COPC/COC Refinement, Aroclor-1260 is eliminated as a COC based on the following reason: "detected concentrations of PCBs are below the industrial worker protection-based RBC, and well below the target action level of 1 mg/kg, although the detections slightly exceeded the residential land use based RBC." According to the Supplemental Guidance to RAGS (CCT, 1992), since only 4 soil samples were collected at AOC 586, the maximum concentration should be used for screening instead of the UCL₉₅. Therefore, the maximum concentration of 870 µg/kg should be compared to the 320 µg/kg residential RBC and the 740 µg/kg industrial RBC. According to the Team Notebook, Aroclor-1260 should be retained as a COC since it exceeds both the residential and industrial RBCs. The text does not clearly indicate that the PCB contamination has been fully delineated. Due to the limited number of samples collected, it is possible that the highest concentration of Aroclor-1260 at AOC 586 has not been detected. The Department recommends a site visit to determine if the delineation of PCBs is adequate and if additional soil sampling is warranted.

CH2M-Jones Response:

We agree with the comment that the total sample size for the PCB analysis of four samples at AOC 586 is a little small to estimate the UCL₉₅, particularly using parametric methods described in the EPA 1992 guidance, as cited in the comment. However, EPA has developed more suitable non-parametric methods (EPA, 1997) since 1992, which are recommend for use with small sample populations as they are better estimators of mean for use as exposure point concentration. EPA also has developed a UCL₉₅ calculation tool (software) called ProUCL, Version 2.1, that is available upon request, without cost, which estimates UCL₉₅ using parametric and non-parametric methods.

As stated in the report, parametric methods resulted in defaulting to maximum as the UCL₉₅ value. Using a non-parametric Bootstrap method (which generates additional numbers based on sample data entered) the estimated UCL₉₅ is at 0.57 mg/kg, compared to a maximum of 0.87 mg/kg. The current EPA Region III industrial RBC for PCBs is 2.9 mg/kg (not 0.74 mg/kg as incorrectly used in the report), which was not exceeded in any of the four samples. Thus, the UCL₉₅ estimates are valid, and the estimated values are above the residential RBC, but below industrial RBC and 1 mg/kg action level established for PCBs.

On this basis, we are agreeable to considering Aroclor 1260 a COC for unrestricted (i.e., residential) land use, but not for industrial land use. Thus, the extent has been defined to meet industrial land use conditions and no further sampling is recommended for this site.

Reference:

U.S. Environmental Protection Agency (Ashok Singh, Anita Singh and Max Englehardt). The Lognormal Distribution in Environmental Applications, EPA Technology Support Center Issue. EPA/600/R-97/006, December 1997.