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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT  
ADDENDUM AREA OF CONCERN 709 (AOC 709) ZONE H CNC CHARLESTON SC  
10/4/2001  
CH2M HILL

# RFI REPORT ADDENDUM

## Area of Concern 709(H), Zone H



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

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

*CH2M-Jones*

*October 2001*

*Contract N62467-99-C-0960*



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October 4, 2001

Mr. David Scaturo  
Division of Hazardous and Infectious Wastes  
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 709(H), Zone H

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum (Revision 0) for AOC 709(H) in Zone H 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 contact him at 770/604-9182, extension 255, if 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 709(H), Zone H



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

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

PREPARED BY  
***CH2M-Jones***

*October 2001*

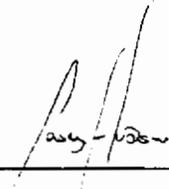
*Revision 0  
Contract N62467-99-C-0960  
158814.ZH.PR.15*

# Certification Page for RFI Report Addendum (Revision 0) – AOC 709(H), Zone H

I, Casey Hudson, 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

Temporary Permit No. T2000358



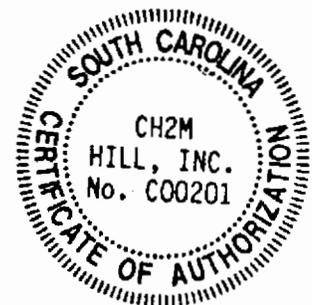
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Casey Hudson, P.E.

09.18.01

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Date



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6		G07 & G038 (DET, 1999)	

# 1 Acronyms and Abbreviations

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2	AOC	area of concern
3	BCT	BRAC Cleanup Team
4	BEQ	benzo(a)pyrene equivalent
5	BRAC	Base Realignment and Closure Act
6	CA	corrective action
7	CFR	Code of Federal Regulations
8	CNC	Charleston Naval Complex
9	COC	chemical of concern
10	COPC	chemical of potential concern
11	DAF	dilution attenuation factor
12	DET	Environmental Detachment Charleston
13	Detachment	U.S. Naval Detachment
14	EGIS	Environmental Geographic Information System
15	EnSafe	EnSafe Inc.
16	EPA	U.S. Environmental Protection Agency
17	EPC	Exposure Point Concentration
18	ESDSOPQAM	EPA Environmental Services Division <i>Standard Operating</i>
19		<i>Procedures and Quality Assurance Manual</i>
20	GPS	Global Positioning System
21	IM	interim measure
22	IMWP	Interim Measure Work Plan
23	µg/kg	micrograms per kilogram
24	MCL	maximum contamination level
25	mg/kg	milligrams per kilogram
26	NAVBASE	Naval Base
27	Navy	United States Navy
28	NFA	no further action

1	OIA	other impacted area
2	OWS	oil/water separator
3	PCB	polychlorinated biphenyl
4	RBC	risk-based concentration
5	RCRA	Resource Conservation and Recovery Act
6	RFA	RCRA Facility Assessment
7	RFI	RCRA Facility Investigation
8	SCDHEC	South Carolina Department of Health and Environmental Control
9	SSL	soil screening level
10	SVOC	semivolatile organic compound
11	SWMU	solid waste management unit
12	UCL <sub>95</sub>	95% Upper Confidence Limit
13	UST	underground storage tank
14	VOC	volatile organic compound
15	WP	work plan



# 1 1.0 Introduction

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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).

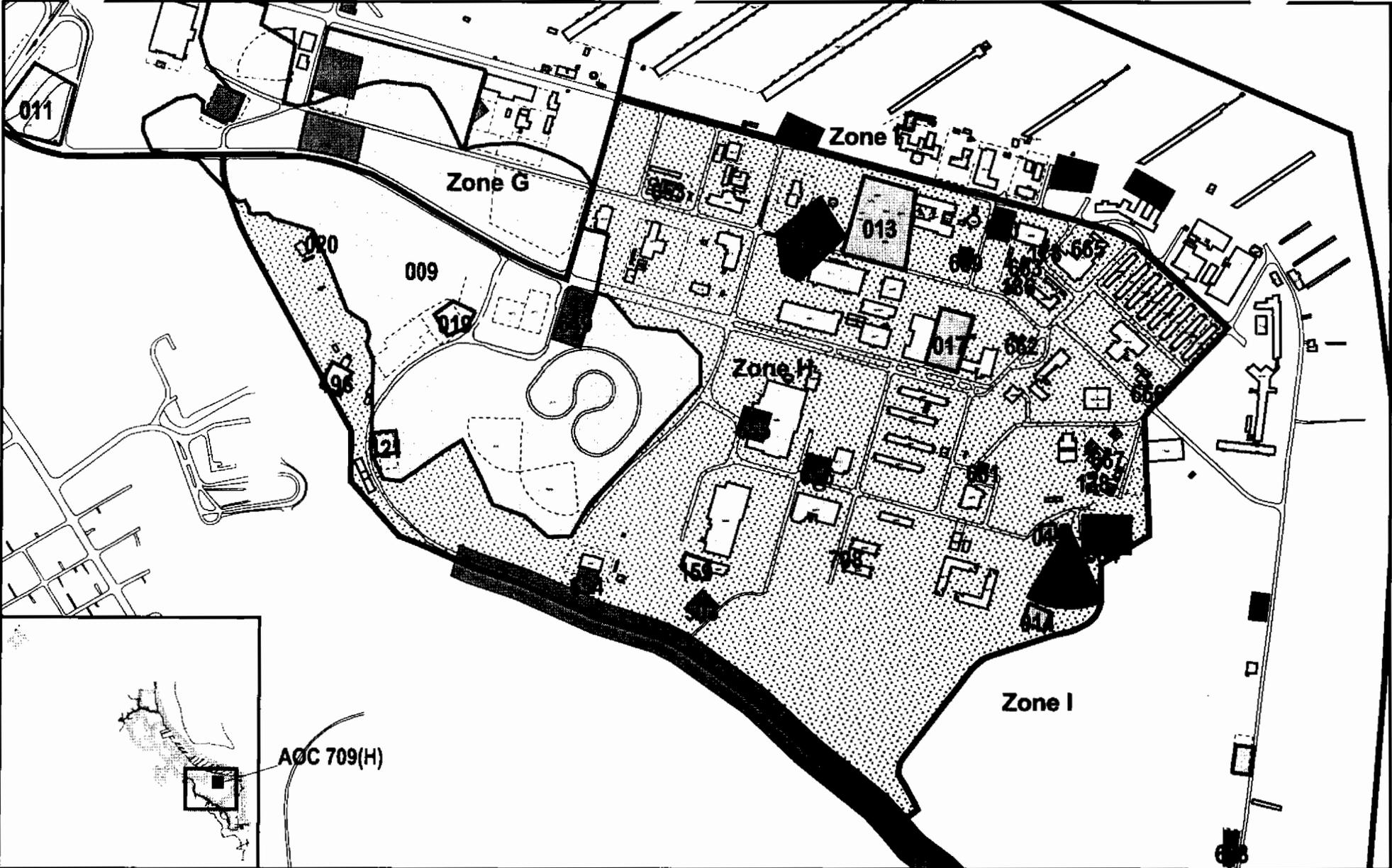
11 In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation  
12 and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to  
13 complete the RCRA Facility Investigation (RFI) for Area of Concern (AOC) 709(H) in Zone  
14 H of the CNC. This site is being recommended for no further action (NFA). Figure 1-1 shows  
15 the locations of the site within Zone H.

## 16 1.1 Background

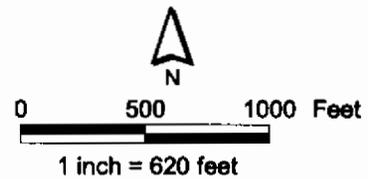
17 AOC 709(H) is located in the northern portion of Zone H near the intersection of Dyess  
18 Avenue and Holland Drive at the CNC. Figure 1-2 shows an aerial photograph (1997) of the  
19 site. This AOC was formerly identified as Other Impacted Areas (OIAs) G07 and G38 during  
20 the RFI and represents two adjacent areas where soil samples from background grid  
21 locations showed concentrations of polychlorinated biphenyls (PCB) above the Region III  
22 residential risk-based concentration (RBC) of 0.32 milligrams per kilogram (mg/kg). These  
23 detections of PCBs warranted further investigation during the RFI. The two grid sample  
24 locations are HGDHSB007 and HGDHSB038 and these are shown in Figure 1-2.

25 Most of the site is paved with asphalt and used as a parking lot. The source of the low-level  
26 PCBs in the soils underlying the asphalt at this site is unknown. Available information does  
27 not indicate solid waste management or other activities at this site involving the use of  
28 PCBs. The site is located in an area of Zone H identified for future industrial land use.

NOTE: Original created in color

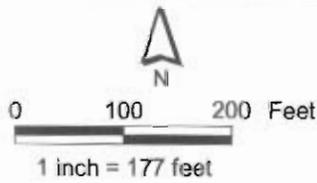
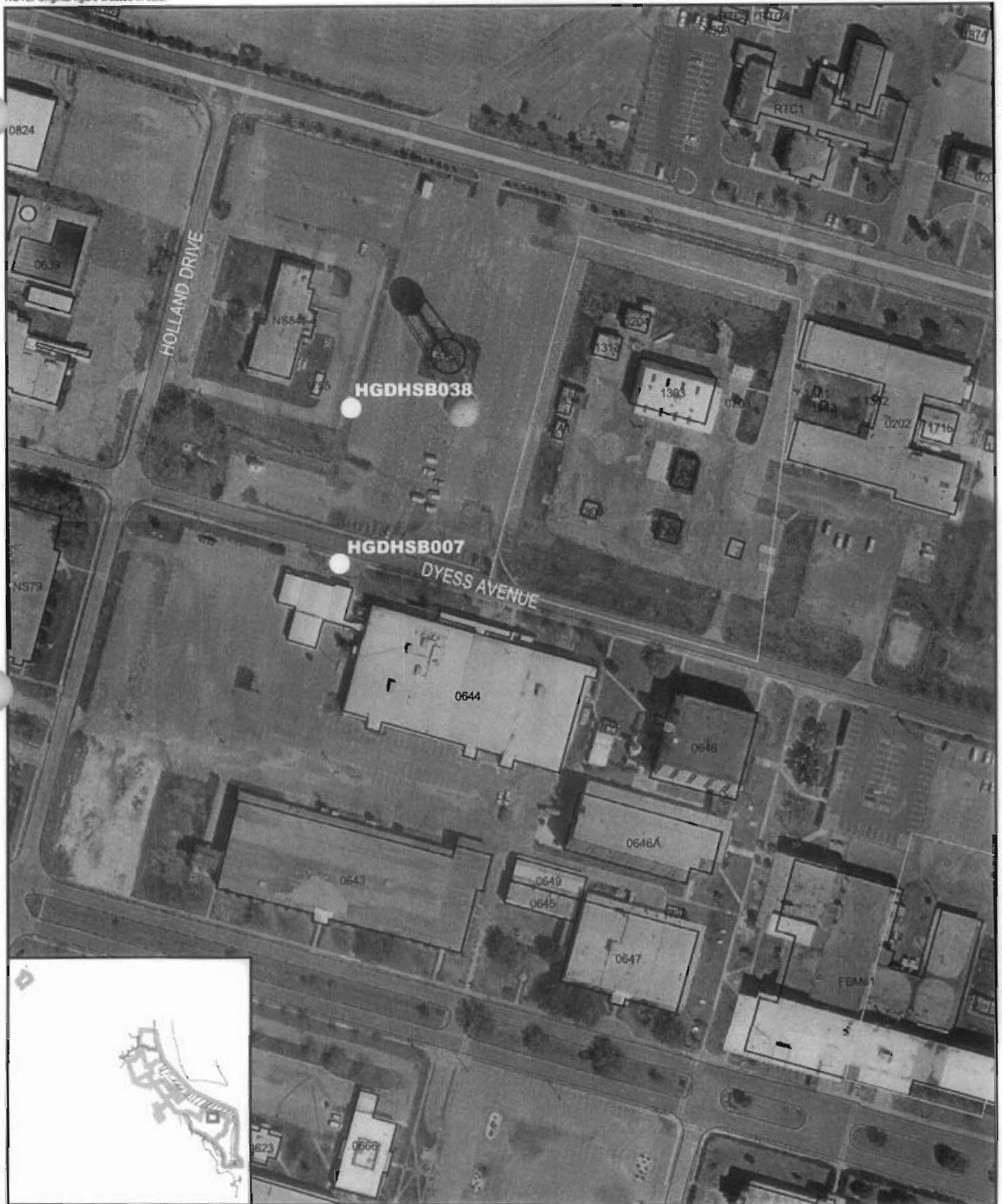


-  Zone H
-  Zone Boundary
-  AOC Boundary
-  SWMU Boundary
-  Buildings



**Figure 1-1**  
Zone H within CNC  
Charleston Naval Complex

NOTE: Aerial Photo Date is 1997  
NOTE: Original figure created in color



**Figure 1-2**  
Site Location  
AOC 709(H), Zone H  
Charleston Naval Complex

## 1 **1.2 Purpose of the RFI Report Addendum**

2 This RFI Report Addendum presents information pertaining to the historic RFI and recent  
3 field investigations at AOC 709(H) in Zone H at the CNC. Based on historic and recent  
4 analytical results of soil sampling at this site, this report recommends no further action for  
5 this site.

## 6 **1.3 Report Organization**

7 This RFI Report Addendum consists of the following seven sections, including this  
8 introductory section:

9 **1.0 Introduction** – Presents the purpose of the report and background information relating  
10 to the RFI Report Addendum.

11 **2.0 Summary of RFI Conclusions for AOC 709(H)** – Summarizes the conclusions from the  
12 RFI investigations and risk evaluations for AOC 709(H).

13 **3.0 Interim Measures** – Provides a summary of the interim measures (IMs) conducted at  
14 AOC 709(H).

15 **4.0 Evaluation of Site Risk** – Provides a methodology for evaluation of site risk based on a  
16 95% Upper Confidence Limit (UCL<sub>95</sub>) approach.

17 **5.0 Summary of Information Related to Site Closeout Issues** – Discusses the various issues  
18 that the BRAC Cleanup Team (BCT) agreed to evaluate prior to site closeout.

19 **6.0 Recommendations** – Provides recommendations for proceeding with site closure.

20 **7.0 References** – Lists the references used in this document.

21 **Appendix A** contains analytical data from sampling conducted subsequent to the *Zone H*  
22 *RFI Report, Revision 0* (EnSafe Inc. [EnSafe], 1996).

23 **Appendix B** contains copies of Figures 1 through 6 of the Environmental Detachment  
24 Charleston (DET) *IM Completion Report*.

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



## 2.0 Summary of RFI Conclusions for AOC 709(H)

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### 2.1 Previous Investigations

During the RFI for Zone H, surface and subsurface soil samples were collected from 104 grid locations to establish a data set to provide the range of background concentrations for site constituents (EnSafe, 1996). The surface and subsurface soil samples collected from grid locations HGDHSB007 and HGDHSB038 were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCBs, pesticides, cyanide, and metals.

At these two grid locations, there were no exceedances of VOCs, SVOCs, pesticides, cyanide, or metals above the residential RBCs in surface soil samples. Additionally, there were no exceedances of these constituents above the soil screening level ([SSL] with a dilution attenuation factor of 1 for VOCs and 10 for inorganics, SVOCs, and other parameters) or detections outside the range of background concentrations in subsurface soils.

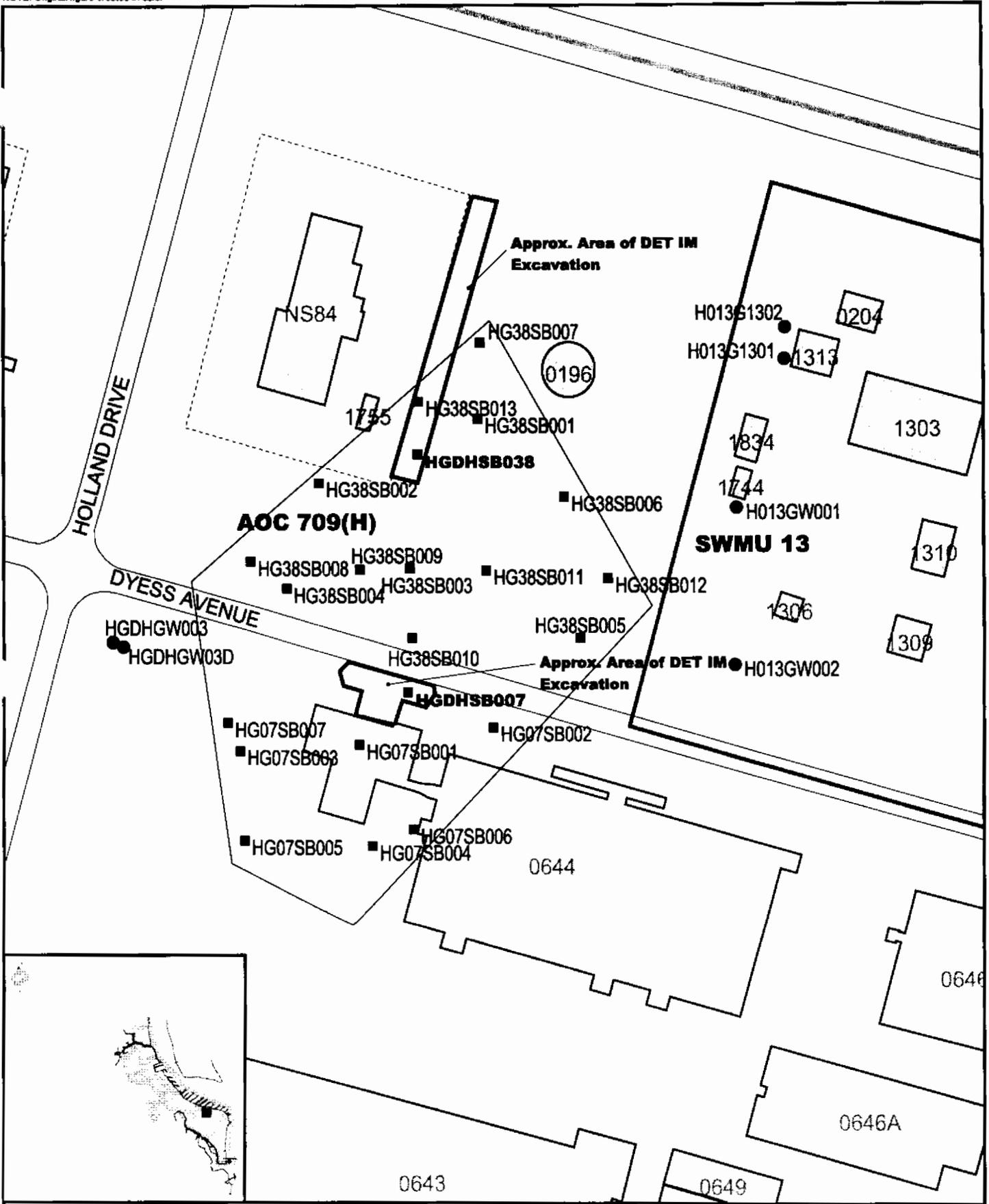
The only site constituent detected in soil samples above the RFI screening goals was PCBs. There were two detections of Aroclor-1260 in surface soils above the residential RBC of 0.32 mg/kg: 2.6 mg/kg at HGDHSB007 and 4 mg/kg at HGDHSB038. The detected concentration of Aroclor-1260 in subsurface soils was 0.29 mg/kg at HGDHSB038.

Based on surface soil exceedances of Aroclor-1260 above the RBC at these locations, several additional surface and subsurface soil samples were collected at the site to investigate the pattern of PCB contamination. The soil sampling locations are shown in Figure 2-1.

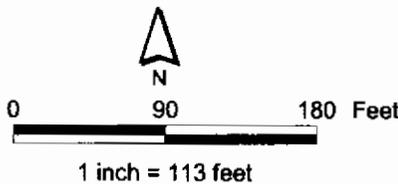
The risk assessment conducted during the RFI identified benzo(a)pyrene equivalents (BEQs) and Aroclor-1260 as chemicals of concern (COCs). However, the BEQ concentrations in surface and subsurface soils are below the BEQ reference concentrations of 1,304 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) for surface soils and 1,400  $\mu\text{g}/\text{kg}$  for subsurface soils that have been adopted for the CNC.

Groundwater was not investigated at this site during the RFI. Analytical results from groundwater samples collected during the RFI from nearby shallow wells in SWMU 13—H013GW001 and H013GW002—as well as shallow grid monitoring well HGDHW003, did

- 1 not detect PCBs, indicating the absence of PCBs in shallow groundwater in the vicinity of
- 2 AOC 709(H).
- 3 The RFI concluded that Aroclor-1260 was the major contributor to site risk in surface soil.
- 4 No ecological risk was anticipated due to the lack of suitable habitat and ecological
- 5 receptors.



- Groundwater Monitor Wells
- Soil Boring Locations
- Buildings



**Figure 2-1**  
Soil Sampling Locations  
AOC 709(H)  
Charleston Naval Complex



## 1 **3.0 Interim Measures**

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### 2 **3.1 Interim Measure (IM) by the Navy DET, 1999**

3 As part of an IM conducted in 1999, the DET excavated and disposed of approximately 144  
4 cubic yards of PCB-impacted soils from the two original grid sample locations, HGDHSB007  
5 and HGDHSB038 (see Figure 2-1 for DET IM excavation locations).

6 The IM activities were documented in a completion report (SCRA, EEG, 1999). Copies of  
7 Figures 1 through 6 from the report which depict IM sampling locations are included in  
8 Appendix B.

9 Confirmatory sampling at both grid locations after the IM excavations indicated that PCB  
10 concentrations were below the target cleanup goal of 1 mg/kg which was adopted based on  
11 40 Code of Federal Regulations (CFR) 761.125, *PCB Remediation Waste* (U.S. Environmental  
12 Protection Agency [EPA], 2001a).

13 Figure 3-1 shows the sample locations and PCB concentrations in surface and subsurface  
14 soils around grid locations HGDHSB007 and HGDHSB038 at the conclusion of the 1996  
15 EnSafe RFI and DET IM efforts. Figure 3-1 shows PCB concentrations from soil boring  
16 locations in SWMU 13, which is adjacent to this site, and indicates the absence of PCB  
17 concentrations on the eastern side of AOC 709(H).

### 18 **3.2 Interim Measure (IM) Sampling by CH2M-Jones, May 2001**

19 During April 2001, CH2M-Jones submitted an IM Work Plan (IMWP) describing the  
20 approach for delineating and removing PCB-impacted soils from two locations (HG38SB005  
21 and HG38SB011) where the PCB concentrations in soil were reported in the RFI as  
22 exceeding the industrial RBC of 2.9 mg/kg (CH2M-Jones, April 2001). The PCB  
23 concentration reported at HG38SB005 was 233 mg/kg in the surface soil sample and 1.68  
24 mg/kg in the subsurface soil sample. Likewise, the reported PCB concentration at  
25 HG38SB011 was 14.2 mg/kg in the surface soil sample. No subsurface soil sample was  
26 collected at HG38SB011 during the RFI.

27 As part of the technical approach presented in the IMWP, the two RFI soil boring locations  
28 HG38SB005 and HG38SB011 were identified in the field using surveyed coordinates from  
29 the RFI. The locations were staked in the field utilizing the Global Positioning System (GPS)

1 equipment. Boring location HG38SB005 was visible due to the grouting that had been done  
2 after the soil sampling from the RFI soil boring.

3 The sampling procedures were performed in accordance with the EPA Environmental  
4 Services Division *Standard Operating Procedures and Quality Assurance Manual*  
5 (ESDSOPQAM) (EPA, 1996a). The IM sampling locations were also photographed.

6 Analytical results of the IM sampling indicated low-level concentrations of Aroclor-1260 at  
7 these two locations. The Aroclor-1260 concentration at HG38SB005 was 0.015 mg/kg in the  
8 upper interval soil sample and 0.0046 mg/kg in the lower interval soil sample. At  
9 HG38SB011, the Aroclor-1260 concentrations were 1.04 mg/kg in the upper interval soil  
10 sample and 1.38 mg/kg in the lower interval soil sample. No other PCB-congeners were  
11 detected above the laboratory method detection limits. Copies of the analytical results  
12 report and the data validation report are included in Appendix A.

13 Table 3-1 shows soil PCB concentrations at the end of the RFI, DET IM and CH2M-Jones IM  
14 sampling efforts.

**TABLE 3-1**  
 Surface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1016	GDHSB00701	GDHSB007	09/27/1994	0.20	U
Aroclor-1221	GDHSB00701	GDHSB007	09/27/1994	0.20	U
Aroclor-1232	GDHSB00701	GDHSB007	09/27/1994	0.20	U
Aroclor-1242	GDHSB00701	GDHSB007	09/27/1994	0.20	U
Aroclor-1248	GDHSB00701	GDHSB007	09/27/1994	0.20	U
Aroclor-1254	GDHSB00701	GDHSB007	09/27/1994	0.20	U
Aroclor-1260	GDHSB00701	GDHSB007	09/27/1994	0.20	U
Aroclor-1016	GDHSB03801	GDHSB038	10/05/1994	0.40	U
Aroclor-1221	GDHSB03801	GDHSB038	10/05/1994	0.40	U
Aroclor-1232	GDHSB03801	GDHSB038	10/05/1994	0.40	U
Aroclor-1242	GDHSB03801	GDHSB038	10/05/1994	0.40	U
Aroclor-1248	GDHSB03801	GDHSB038	10/05/1994	0.40	U
Aroclor-1254	GDHSB03801	GDHSB038	10/05/1994	0.40	U
Aroclor-1260	GDHSB03801	GDHSB038	10/05/1994	0.12	U
Aroclor-1016	G07SB00101	HG07SB001	02/02/1995	0.20	U
Aroclor-1221	G07SB00101	HG07SB001	02/02/1995	0.20	U
Aroclor-1232	G07SB00101	HG07SB001	02/02/1995	0.20	U
Aroclor-1242	G07SB00101	HG07SB001	02/02/1995	0.20	U
Aroclor-1248	G07SB00101	HG07SB001	02/02/1995	0.20	U
Aroclor-1254	G07SB00101	HG07SB001	02/02/1995	0.20	U
Aroclor-1260	G07SB00101	HG07SB001	02/02/1995	0.97	=
Aroclor-1016	G07SB00201	HG07SB002	02/02/1995	0.04	U
Aroclor-1221	G07SB00201	HG07SB002	02/02/1995	0.04	U
Aroclor-1232	G07SB00201	HG07SB002	02/02/1995	0.04	U
Aroclor-1242	G07SB00201	HG07SB002	02/02/1995	0.04	U
Aroclor-1248	G07SB00201	HG07SB002	02/02/1995	0.04	U
Aroclor-1254	G07SB00201	HG07SB002	02/02/1995	0.04	U
Aroclor-1260	G07SB00201	HG07SB002	02/02/1995	0.04	U
Aroclor-1016	G07SB00301	HG07SB003	11/26/1996	0.04	U
Aroclor-1221	G07SB00301	HG07SB003	11/26/1996	0.08	U
Aroclor-1232	G07SB00301	HG07SB003	11/26/1996	0.04	U
Aroclor-1242	G07SB00301	HG07SB003	11/26/1996	0.04	U
Aroclor-1248	G07SB00301	HG07SB003	11/26/1996	0.04	U
Aroclor-1254	G07SB00301	HG07SB003	11/26/1996	0.04	U
Aroclor-1260	G07SB00301	HG07SB003	11/26/1996	0.04	U
Aroclor-1016	G07SB00401	HG07SB004	11/26/1996	0.04	U
Aroclor-1221	G07SB00401	HG07SB004	11/26/1996	0.07	U
Aroclor-1232	G07SB00401	HG07SB004	11/26/1996	0.04	U

**TABLE 3-1**  
 Surface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1242	G07SB00401	HG07SB004	11/26/1996	0.04	U
Aroclor-1248	G07SB00401	HG07SB004	11/26/1996	0.04	U
Aroclor-1254	G07SB00401	HG07SB004	11/26/1996	0.04	U
Aroclor-1260	G07SB00401	HG07SB004	11/26/1996	0.04	U
Aroclor-1016	G07SB00501	HG07SB005	10/21/1997	0.04	U
Aroclor-1221	G07SB00501	HG07SB005	10/21/1997	0.08	U
Aroclor-1232	G07SB00501	HG07SB005	10/21/1997	0.04	U
Aroclor-1242	G07SB00501	HG07SB005	10/21/1997	0.04	U
Aroclor-1248	G07SB00501	HG07SB005	10/21/1997	0.04	U
Aroclor-1254	G07SB00501	HG07SB005	10/21/1997	0.04	U
Aroclor-1260	G07SB00501	HG07SB005	10/21/1997	0.04	U
Aroclor-1016	G07SB00601	HG07SB006	10/21/1997	0.19	U
Aroclor-1221	G07SB00601	HG07SB006	10/21/1997	0.38	U
Aroclor-1232	G07SB00601	HG07SB006	10/21/1997	0.19	U
Aroclor-1242	G07SB00601	HG07SB006	10/21/1997	0.19	U
Aroclor-1248	G07SB00601	HG07SB006	10/21/1997	0.19	U
Aroclor-1254	G07SB00601	HG07SB006	10/21/1997	0.19	U
Aroclor-1260	G07SB00601	HG07SB006	10/21/1997	0.80	=
Aroclor-1016	G07SB00701	HG07SB007	10/21/1997	0.04	U
Aroclor-1221	G07SB00701	HG07SB007	10/21/1997	0.07	U
Aroclor-1232	G07SB00701	HG07SB007	10/21/1997	0.04	U
Aroclor-1242	G07SB00701	HG07SB007	10/21/1997	0.04	U
Aroclor-1248	G07SB00701	HG07SB007	10/21/1997	0.04	U
Aroclor-1254	G07SB00701	HG07SB007	10/21/1997	0.04	U
Aroclor-1260	G07SB00701	HG07SB007	10/21/1997	0.04	U
Aroclor-1016	G38SB00101	HG38SB001	02/03/1995	0.04	U
Aroclor-1221	G38SB00101	HG38SB001	02/03/1995	0.04	U
Aroclor-1232	G38SB00101	HG38SB001	02/03/1995	0.04	U
Aroclor-1242	G38SB00101	HG38SB001	02/03/1995	0.04	U
Aroclor-1248	G38SB00101	HG38SB001	02/03/1995	0.04	U
Aroclor-1254	G38SB00101	HG38SB001	02/03/1995	0.04	U
Aroclor-1260	G38SB00101	HG38SB001	02/03/1995	0.04	U
Aroclor-1016	G38SB00201	HG38SB002	02/03/1995	0.05	U
Aroclor-1221	G38SB00201	HG38SB002	02/03/1995	0.05	U
Aroclor-1232	G38SB00201	HG38SB002	02/03/1995	0.05	U
Aroclor-1242	G38SB00201	HG38SB002	02/03/1995	0.05	U
Aroclor-1248	G38SB00201	HG38SB002	02/03/1995	0.05	U
Aroclor-1254	G38SB00201	HG38SB002	02/03/1995	0.05	U

**TABLE 3-1**  
 Surface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1260	G38SB00201	HG38SB002	02/03/1995	0.05	U
Aroclor-1016	G38SB00301	HG38SB003	02/02/1995	0.20	U
Aroclor-1221	G38SB00301	HG38SB003	02/02/1995	0.20	U
Aroclor-1232	G38SB00301	HG38SB003	02/02/1995	0.20	U
Aroclor-1242	G38SB00301	HG38SB003	02/02/1995	0.20	U
Aroclor-1248	G38SB00301	HG38SB003	02/02/1995	0.20	U
Aroclor-1254	G38SB00301	HG38SB003	02/02/1995	0.20	U
Aroclor-1260	G38SB00301	HG38SB003	02/02/1995	1.10	=
Aroclor-1016	G38SB00401	HG38SB004	11/26/1996	0.05	U
Aroclor-1221	G38SB00401	HG38SB004	11/26/1996	0.10	U
Aroclor-1232	G38SB00401	HG38SB004	11/26/1996	0.05	U
Aroclor-1242	G38SB00401	HG38SB004	11/26/1996	0.05	U
Aroclor-1248	G38SB00401	HG38SB004	11/26/1996	0.05	U
Aroclor-1254	G38SB00401	HG38SB004	11/26/1996	0.05	U
Aroclor-1260	G38SB00401	HG38SB004	11/26/1996	0.05	U
Aroclor-1016	G38SB00501	HG38SB005	11/26/1996	4.06	UJ
Aroclor-1221	G38SB00501	HG38SB005	11/26/1996	8.25	UJ
Aroclor-1232	G38SB00501	HG38SB005	11/26/1996	4.06	UJ
Aroclor-1242	G38SB00501	HG38SB005	11/26/1996	4.06	UJ
Aroclor-1248	G38SB00501	HG38SB005	11/26/1996	4.06	UJ
Aroclor-1254	G38SB00501	HG38SB005	11/26/1996	4.06	UJ
Aroclor-1260	G38SB00501	HG38SB005	11/26/1996	233.00 <sup>a</sup>	J
Aroclor-1016	G38SB00601	HG38SB006	11/26/1996	0.04	U
Aroclor-1221	G38SB00601	HG38SB006	11/26/1996	0.08	U
Aroclor-1232	G38SB00601	HG38SB006	11/26/1996	0.04	U
Aroclor-1242	G38SB00601	HG38SB006	11/26/1996	0.04	U
Aroclor-1248	G38SB00601	HG38SB006	11/26/1996	0.04	U
Aroclor-1254	G38SB00601	HG38SB006	11/26/1996	0.04	U
Aroclor-1260	G38SB00601	HG38SB006	11/26/1996	0.39	=
Aroclor-1016	G38SB00701	HG38SB007	11/26/1996	0.04	U
Aroclor-1221	G38SB00701	HG38SB007	11/26/1996	0.07	U
Aroclor-1232	G38SB00701	HG38SB007	11/26/1996	0.04	U
Aroclor-1242	G38SB00701	HG38SB007	11/26/1996	0.04	U
Aroclor-1248	G38SB00701	HG38SB007	11/26/1996	0.04	U
Aroclor-1254	G38SB00701	HG38SB007	11/26/1996	0.04	U
Aroclor-1260	G38SB00701	HG38SB007	11/26/1996	0.04	U
Aroclor-1016	G38SB00801	HG38SB008	10/21/1997	0.05	U
Aroclor-1221	G38SB00801	HG38SB008	10/21/1997	0.10	U

**TABLE 3-1**  
 Surface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1232	G38SB00801	HG38SB008	10/21/1997	0.05	U
Aroclor-1242	G38SB00801	HG38SB008	10/21/1997	0.05	U
Aroclor-1248	G38SB00801	HG38SB008	10/21/1997	0.05	U
Aroclor-1254	G38SB00801	HG38SB008	10/21/1997	0.05	U
Aroclor-1260	G38SB00801	HG38SB008	10/21/1997	0.01	J
Aroclor-1016	G38SB00901	HG38SB009	10/21/1997	0.04	U
Aroclor-1221	G38SB00901	HG38SB009	10/21/1997	0.07	U
Aroclor-1232	G38SB00901	HG38SB009	10/21/1997	0.04	U
Aroclor-1242	G38SB00901	HG38SB009	10/21/1997	0.04	U
Aroclor-1248	G38SB00901	HG38SB009	10/21/1997	0.04	U
Aroclor-1254	G38SB00901	HG38SB009	10/21/1997	0.04	U
Aroclor-1260	G38SB00901	HG38SB009	10/21/1997	0.11	=
Aroclor-1016	G38SB01001	HG38SB010	10/21/1997	0.04	U
Aroclor-1221	G38SB01001	HG38SB010	10/21/1997	0.07	U
Aroclor-1232	G38SB01001	HG38SB010	10/21/1997	0.04	U
Aroclor-1242	G38SB01001	HG38SB010	10/21/1997	0.04	U
Aroclor-1248	G38SB01001	HG38SB010	10/21/1997	0.04	U
Aroclor-1254	G38SB01001	HG38SB010	10/21/1997	0.04	U
Aroclor-1260	G38SB01001	HG38SB010	10/21/1997	0.05	=
Aroclor-1016	G38SB01101	HG38SB011	10/21/1997	4.00	U
Aroclor-1221	G38SB01101	HG38SB011	10/21/1997	8.00	U
Aroclor-1232	G38SB01101	HG38SB011	10/21/1997	4.00	U
Aroclor-1242	G38SB01101	HG38SB011	10/21/1997	4.00	U
Aroclor-1248	G38SB01101	HG38SB011	10/21/1997	4.00	U
Aroclor-1254	G38SB01101	HG38SB011	10/21/1997	4.00	U
Aroclor-1260	G38SB01101	HG38SB011	10/21/1997	14.20	=
Aroclor-1016	G38SB01201	HG38SB012	10/21/1997	0.04	U
Aroclor-1221	G38SB01201	HG38SB012	10/21/1997	0.09	U
Aroclor-1232	G38SB01201	HG38SB012	10/21/1997	0.04	U
Aroclor-1242	G38SB01201	HG38SB012	10/21/1997	0.04	U
Aroclor-1248	G38SB01201	HG38SB012	10/21/1997	0.04	U
Aroclor-1254	G38SB01201	HG38SB012	10/21/1997	0.04	U
Aroclor-1260	G38SB01201	HG38SB012	10/21/1997	0.06	=
Aroclor-1016	G38SB01301	HG38SB013	10/21/1997	0.04	U
Aroclor-1221	G38SB01301	HG38SB013	10/21/1997	0.08	U
Aroclor-1232	G38SB01301	HG38SB013	10/21/1997	0.04	U
Aroclor-1242	G38SB01301	HG38SB013	10/21/1997	0.04	U
Aroclor-1248	G38SB01301	HG38SB013	10/21/1997	0.04	U

**TABLE 3-1**  
 Surface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1254	G38SB01301	HG38SB013	10/21/1997	0.04	U
Aroclor-1260	G38SB01301	HG38SB013	10/21/1997	0.04	U
Aroclor-1016	G38SB01401	HG38SB005	05/08/2001	0.04	U
Aroclor-1221	G38SB01401	HG38SB005	05/08/2001	0.04	U
Aroclor-1232	G38SB01401	HG38SB005	05/08/2001	0.04	U
Aroclor-1242	G38SB01401	HG38SB005	05/08/2001	0.04	U
Aroclor-1248	G38SB01401	HG38SB005	05/08/2001	0.04	U
Aroclor-1254	G38SB01401	HG38SB005	05/08/2001	0.07	U
Aroclor-1260	G38SB01401	HG38SB005	05/08/2001	0.02	U
Aroclor-1016	G38SB01501	HG38SB011	05/08/2001	0.16	U
Aroclor-1221	G38SB01501	HG38SB011	05/08/2001	0.16	U
Aroclor-1232	G38SB01501	HG38SB011	05/08/2001	0.16	U
Aroclor-1242	G38SB01501	HG38SB011	05/08/2001	0.16	U
Aroclor-1248	G38SB01501	HG38SB011	05/08/2001	0.16	U
Aroclor-1254	G38SB01501	HG38SB011	05/08/2001	0.16	U
Aroclor-1260	G38SB01501	HG38SB011	05/08/2001	1.04	=

= Analyte is detected at the concentration shown.

J Analyte is detected at a concentration below the method detection limit; the concentration is not known.

U Samples were analyzed for this analyte, but the analyte was not detected above the method detection limit (MDL).

mg/kg milligrams per kilogram

a This location was resampled and this value is replaced by current concentration represented by sample ID G38SB01401 in this table.

**TABLE 3-2**  
 Subsurface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1016	GDHSB00702	GDHSB007	09/27/1994	0.04	U
Aroclor-1221	GDHSB00702	GDHSB007	09/27/1994	0.04	U
Aroclor-1232	GDHSB00702	GDHSB007	09/27/1994	0.04	U
Aroclor-1242	GDHSB00702	GDHSB007	09/27/1994	0.04	U
Aroclor-1248	GDHSB00702	GDHSB007	09/27/1994	0.04	U
Aroclor-1254	GDHSB00702	GDHSB007	09/27/1994	0.04	U
Aroclor-1260	GDHSB00702	GDHSB007	09/27/1994	0.12	=
Aroclor-1016	GDHSB03802	GDHSB038	10/05/1994	0.05	U
Aroclor-1221	GDHSB03802	GDHSB038	10/05/1994	0.05	U
Aroclor-1232	GDHSB03802	GDHSB038	10/05/1994	0.05	U
Aroclor-1242	GDHSB03802	GDHSB038	10/05/1994	0.05	U
Aroclor-1248	GDHSB03802	GDHSB038	10/05/1994	0.05	U
Aroclor-1254	GDHSB03802	GDHSB038	10/05/1994	0.05	U
Aroclor-1260	GDHSB03802	GDHSB038	10/05/1994	0.11	=
Aroclor-1016	G07SB00102	HG07SB001	02/02/1995	0.04	U
Aroclor-1221	G07SB00102	HG07SB001	02/02/1995	0.04	U
Aroclor-1232	G07SB00102	HG07SB001	02/02/1995	0.04	U
Aroclor-1242	G07SB00102	HG07SB001	02/02/1995	0.04	U
Aroclor-1248	G07SB00102	HG07SB001	02/02/1995	0.04	U
Aroclor-1254	G07SB00102	HG07SB001	02/02/1995	0.04	U
Aroclor-1260	G07SB00102	HG07SB001	02/02/1995	0.04	U
Aroclor-1016	G07SB00202	HG07SB002	02/02/1995	0.04	U
Aroclor-1221	G07SB00202	HG07SB002	02/02/1995	0.04	U
Aroclor-1232	G07SB00202	HG07SB002	02/02/1995	0.04	U
Aroclor-1242	G07SB00202	HG07SB002	02/02/1995	0.04	U
Aroclor-1248	G07SB00202	HG07SB002	02/02/1995	0.04	U
Aroclor-1254	G07SB00202	HG07SB002	02/02/1995	0.04	U
Aroclor-1260	G07SB00202	HG07SB002	02/02/1995	0.04	U
Aroclor-1016	G07SB00302	HG07SB003	11/26/1996	0.03	U
Aroclor-1221	G07SB00302	HG07SB003	11/26/1996	0.07	U
Aroclor-1232	G07SB00302	HG07SB003	11/26/1996	0.03	U
Aroclor-1242	G07SB00302	HG07SB003	11/26/1996	0.03	U
Aroclor-1248	G07SB00302	HG07SB003	11/26/1996	0.03	U
Aroclor-1254	G07SB00302	HG07SB003	11/26/1996	0.03	U
Aroclor-1260	G07SB00302	HG07SB003	11/26/1996	0.03	U
Aroclor-1016	G07SB00402	HG07SB004	11/26/1996	0.04	U
Aroclor-1221	G07SB00402	HG07SB004	11/26/1996	0.08	U
Aroclor-1232	G07SB00402	HG07SB004	11/26/1996	0.04	U
Aroclor-1242	G07SB00402	HG07SB004	11/26/1996	0.04	U

**TABLE 3-2**  
 Subsurface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1248	G07SB00402	HG07SB004	11/26/1996	0.04	U
Aroclor-1254	G07SB00402	HG07SB004	11/26/1996	0.04	U
Aroclor-1260	G07SB00402	HG07SB004	11/26/1996	0.04	U
Aroclor-1016	G07SB00702	HG07SB007	10/21/1997	0.04	U
Aroclor-1221	G07SB00702	HG07SB007	10/21/1997	0.07	U
Aroclor-1232	G07SB00702	HG07SB007	10/21/1997	0.04	U
Aroclor-1242	G07SB00702	HG07SB007	10/21/1997	0.04	U
Aroclor-1248	G07SB00702	HG07SB007	10/21/1997	0.04	U
Aroclor-1254	G07SB00702	HG07SB007	10/21/1997	0.04	U
Aroclor-1260	G07SB00702	HG07SB007	10/21/1997	0.04	U
Aroclor-1016	G38SB00102	HG38SB001	02/03/1995	0.04	U
Aroclor-1221	G38SB00102	HG38SB001	02/03/1995	0.04	U
Aroclor-1232	G38SB00102	HG38SB001	02/03/1995	0.04	U
Aroclor-1242	G38SB00102	HG38SB001	02/03/1995	0.04	U
Aroclor-1248	G38SB00102	HG38SB001	02/03/1995	0.04	U
Aroclor-1254	G38SB00102	HG38SB001	02/03/1995	0.04	U
Aroclor-1260	G38SB00102	HG38SB001	02/03/1995	0.16	=
Aroclor-1016	G38SB00202	HG38SB002	02/03/1995	0.06	U
Aroclor-1221	G38SB00202	HG38SB002	02/03/1995	0.06	U
Aroclor-1232	G38SB00202	HG38SB002	02/03/1995	0.06	U
Aroclor-1242	G38SB00202	HG38SB002	02/03/1995	0.06	U
Aroclor-1248	G38SB00202	HG38SB002	02/03/1995	0.06	U
Aroclor-1254	G38SB00202	HG38SB002	02/03/1995	0.06	U
Aroclor-1260	G38SB00202	HG38SB002	02/03/1995	0.06	U
Aroclor-1016	G38SB00302	HG38SB003	02/02/1995	0.06	U
Aroclor-1221	G38SB00302	HG38SB003	02/02/1995	0.06	U
Aroclor-1232	G38SB00302	HG38SB003	02/02/1995	0.06	U
Aroclor-1242	G38SB00302	HG38SB003	02/02/1995	0.06	U
Aroclor-1248	G38SB00302	HG38SB003	02/02/1995	0.06	U
Aroclor-1254	G38SB00302	HG38SB003	02/02/1995	0.06	U
Aroclor-1260	G38SB00302	HG38SB003	02/02/1995	0.06	U
Aroclor-1016	G38SB00402	HG38SB004	11/26/1996	0.04	U
Aroclor-1221	G38SB00402	HG38SB004	11/26/1996	0.08	U
Aroclor-1232	G38SB00402	HG38SB004	11/26/1996	0.04	U
Aroclor-1242	G38SB00402	HG38SB004	11/26/1996	0.04	U
Aroclor-1248	G38SB00402	HG38SB004	11/26/1996	0.04	U
Aroclor-1254	G38SB00402	HG38SB004	11/26/1996	0.04	U
Aroclor-1260	G38SB00402	HG38SB004	11/26/1996	0.04	U

**TABLE 3-2**  
 Subsurface Soil PCB Sampling Results  
 RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1016	G38SB00502	HG38SB005	11/26/1996	0.04	U
Aroclor-1221	G38SB00502	HG38SB005	11/26/1996	0.08	U
Aroclor-1232	G38SB00502	HG38SB005	11/26/1996	0.04	U
Aroclor-1242	G38SB00502	HG38SB005	11/26/1996	0.04	U
Aroclor-1248	G38SB00502	HG38SB005	11/26/1996	0.05	=
Aroclor-1254	G38SB00502	HG38SB005	11/26/1996	0.04	U
Aroclor-1260	G38SB00502	HG38SB005	11/26/1996	1.68 <sup>a</sup>	=
Aroclor-1016	G38SB00602	HG38SB006	11/26/1996	0.04	U
Aroclor-1221	G38SB00602	HG38SB006	11/26/1996	0.08	U
Aroclor-1232	G38SB00602	HG38SB006	11/26/1996	0.04	U
Aroclor-1242	G38SB00602	HG38SB006	11/26/1996	0.04	U
Aroclor-1248	G38SB00602	HG38SB006	11/26/1996	0.04	U
Aroclor-1254	G38SB00602	HG38SB006	11/26/1996	0.04	U
Aroclor-1260	G38SB00602	HG38SB006	11/26/1996	0.07	=
Aroclor-1016	G38SB00702	HG38SB007	11/26/1996	0.04	U
Aroclor-1221	G38SB00702	HG38SB007	11/26/1996	0.08	U
Aroclor-1232	G38SB00702	HG38SB007	11/26/1996	0.04	U
Aroclor-1242	G38SB00702	HG38SB007	11/26/1996	0.04	U
Aroclor-1248	G38SB00702	HG38SB007	11/26/1996	0.04	U
Aroclor-1254	G38SB00702	HG38SB007	11/26/1996	0.04	U
Aroclor-1260	G38SB00702	HG38SB007	11/26/1996	0.04	U
Aroclor-1016	G38SB01002	HG38SB010	10/21/1997	0.04	U
Aroclor-1221	G38SB01002	HG38SB010	10/21/1997	0.08	U
Aroclor-1232	G38SB01002	HG38SB010	10/21/1997	0.04	U
Aroclor-1242	G38SB01002	HG38SB010	10/21/1997	0.04	U
Aroclor-1248	G38SB01002	HG38SB010	10/21/1997	0.04	U
Aroclor-1254	G38SB01002	HG38SB010	10/21/1997	0.04	U
Aroclor-1260	G38SB01002	HG38SB010	10/21/1997	0.04	U
Aroclor-1016	G38SB01402	HG38SB005	05/08/2001	0.04	U
Aroclor-1221	G38SB01402	HG38SB005	05/08/2001	0.04	U
Aroclor-1232	G38SB01402	HG38SB005	05/08/2001	0.04	U
Aroclor-1242	G38SB01402	HG38SB005	05/08/2001	0.04	U
Aroclor-1248	G38SB01402	HG38SB005	05/08/2001	0.04	U
Aroclor-1254	G38SB01402	HG38SB005	05/08/2001	0.08	U
Aroclor-1260	G38SB01402	HG38SB005	05/08/2001	0.0046	J
Aroclor-1016	G38SB01502	HG38SB011	05/08/2001	0.16	U
Aroclor-1221	G38SB01502	HG38SB011	05/08/2001	0.16	U
Aroclor-1232	G38SB01502	HG38SB011	05/08/2001	0.16	U
Aroclor-1242	G38SB01502	HG38SB011	05/08/2001	0.16	U

**TABLE 3-2**  
 Subsurface Soil PCB Sampling Results  
*RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex*

Parameter	Sample ID	Station ID	Date Sample Collected	Result (mg/kg)	Qualifier
Aroclor-1248	G38SB01502	HG38SB011	05/08/2001	0.16	U
Aroclor-1254	G38SB01502	HG38SB011	05/08/2001	0.16	U
Aroclor-1260	G38SB01502	HG38SB011	05/08/2001	1.38	J

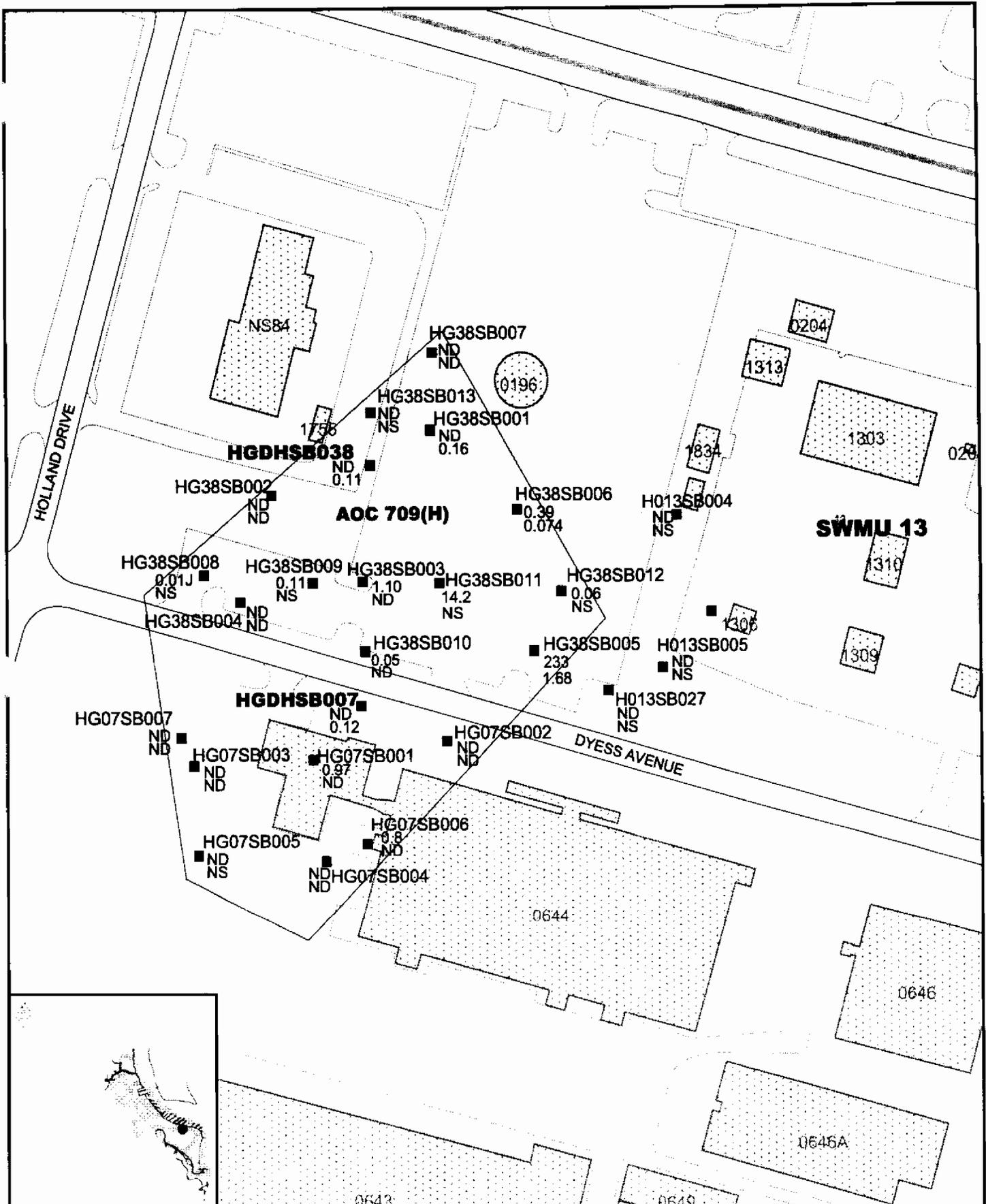
= Analyte is detected at the concentration shown.

J Analyte is detected at a concentration below the method detection limit; the concentration is not known.

U Samples were analyzed for this analyte, but the analyte was not detected above the method detection limit (MDL).

mg/kg milligrams per kilogram

a This location was resampled and this value should be replaced by current concentration represented by sample ID G38SB01402 in this table.



- Soil Boring Location
- 233 Surface Soil PCB Conc. (mg/kg) (RFI, 1996)
- (0.015J) Subsurface Soil PCB Conc. (mg/kg) (IM, May 2001)
- 1.68 Subsurf. Soil PCB Conc. (mg/kg) (RFI, 1996)
- (0.0046J) Subsurf. Soil PCB Conc. (mg/kg) (IM, May 2001)



**Figure 3-1**  
 Soil PCB Concentrations  
 AOC 709(H), Zone H  
 Charleston Naval Complex

## 4.0 Evaluation of Site Risk

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This section describes the residual risk at the site, based on current environmental conditions and soil concentrations of PCBs.

As described in the previous section, the technical approach of the IMWP submitted to SCDHEC during April 2001 entailed the delineation and removal of PCB-contaminated soil at two locations, HG38SB005 and HG38SB011, where surface soil PCB concentrations were detected above the industrial RBC of 2.9 mg/kg during the RFI. All other sampling locations from the RFI showed PCB concentrations below 1 mg/kg, with the exception of HG38SB003. At HG38SB003, the PCB concentration in surface soil was 1.10 mg/kg, which is slightly above the 1 mg/kg goal established by the EPA for high occupancy areas (EPA, 2001a). Most soil boring locations at AOC 709(H) and from neighboring soil boring locations at SWMU 13 show PCB concentrations below detection limits (non-detects), and the average for sitewide PCB concentrations is less than 1 mg/kg.

The subsurface soil PCB concentrations ranged between 0.004 mg/kg to 1.38 mg/kg, with an average detected concentration of 0.35 mg/kg.

A generic SSL is not available for Aroclor-1260. Therefore, a site-specific SSL was calculated, assuming that in the future the site may be entirely unpaved. This site-specific SSL calculation is consistent with the U.S. Environmental Protection Agency (EPA)'s *Soil Screening Guidance: User's Guide* (EPA, 1996b) and the *Soil Screening Guidance: Technical Background Document* (EPA, 1996c). Table 4-1 presents the SSL calculation and input parameters. The SSL for Aroclor-1260 was determined to be 7.4 mg/kg. Overall subsurface PCBs did not exceed the SSL values. Therefore, leachability to groundwater is not a concern for PCB concentrations at AOC 709(H).

### 4.1 Exposure Point Concentration (EPC) Estimation

The soils at the site with detected PCB concentrations are under asphalt pavement. Assuming the asphalt pavement may be removed at a future time, exposure point concentrations were estimated for all the surface soil PCB data from the site (background samples and subsurface soil samples were not included in this evaluation). A UCL<sub>95</sub> concentration was estimated for the surface soils at the site. This estimation included all samples collected within the top 1-ft interval of soil. The higher PCB concentrations detected

1 during the RFI from the HG38SB005 and HG38SB011 were replaced with the PCB  
2 concentrations detected during the May 2001 resampling. Table 4-1 includes the sample  
3 locations, sample IDs, their respective Aroclor-1260 concentrations, and the estimated UCL<sub>95</sub>  
4 for the site. The resulting UCL<sub>95</sub> estimate was 0.11 mg/kg, which is well below the target  
5 concentration of 1 mg/kg for unrestricted land use. Therefore, AOC 709(H) is suitable for  
6 unrestricted future land use.

7 The reason why two samples collected during the RFI reported elevated concentrations of  
8 PCBs while resampling those same locations did not confirm the presence of elevated PCBs  
9 is unknown. It is possible that the previous RFI samples contained a small droplet of PCB  
10 containing oil, which was released during whatever activities created the original PCB  
11 contamination. However, the lack of confirmation of these elevated PCB concentrations  
12 during subsequent sampling at these locations suggests that these locations do not contain a  
13 significant residual source area. Thus, the residual site risk should be determined for an  
14 exposure point concentration, as calculated above, assuming that the lower PCB  
15 concentrations detected across the sites are most representative of the actual likely  
16 concentrations to which a receptor may be exposed.

Table 4-1

SSL Calculation for Aroclor-1260  
RFI Report Addendum, AOC 709(H), Zone H, Charleston Naval Complex

		Parameter	Aroclor-1260
<b>Chemical Specific Input Parameters</b>			
Cw = Target groundwater concentration MCL (mg/L)			5.00E-04
H = Henry's Law Constant, dimensionless			1.89E-01
ks = Soil-water sorption coefficient (cm <sup>3</sup> water / g soil = L/kg) = Koc x foc where koc = organic carbon-water sorption coefficient, (cm <sup>3</sup> (ml) water) / (g soluble organic carbon) foc = Fraction of organic content, dimensionless		0.0084	7.14E+03 8.50E+05
<b>Site Specific Input Parameters</b>			
Sw = Width of Source Parallel to Groundwater Flow Direction (impacted soil zone)	3.0 m	10 ft	
da = Aquifer Thickness	13.1 m	43 ft	
d = Groundwater Mixing Zone thickness	2.22 m	7.3 ft	
i = Groundwater Gradient		1.0E-03 (unitless)	
Ks = Saturated Hydraulic Conductivity	445.0 m/yr	1480.0 ft/yr	
θw = Volumetric Water Content of Soil Pore Space	0.3 cm <sup>3</sup> vapor/cm <sup>3</sup> soil	0.3 in <sup>3</sup> vapor/in <sup>3</sup> soil	
θv = Volumetric Vapor Content of Soil Pore Space	0.13 cm <sup>3</sup> vapor/cm <sup>3</sup> soil	0.13 in <sup>3</sup> vapor/in <sup>3</sup> soil	
ρs = Soil Bulk Density	1.5 g/cm <sup>3</sup>	93.64 lb <sub>m</sub> /ft <sup>3</sup>	
qi = Water Infiltration Rate	0.3000 m/yr	1.0000 ft/yr	
Partition Term, Cw/Csoil, (L/kg)	$\frac{C_{soil}}{C_w} \left( \frac{\theta_w + K_s \rho_s + H \theta_v}{\rho_s} \right) \left( \frac{K_s d + q_s}{q_s} \right)$		7.140E+03
Dilution Term, dimensionless	$\frac{C_{soil}}{C_w} \left( \frac{\theta_w + K_s \rho_s + H \theta_v}{\rho_s} \right) \left( \frac{K_s d + q_s}{q_s} \right)$		2.083E+00
Csoil/Cw = Partition term * Dilution term (mg/kg / mg/L) = L/kg			1.487E+04
<b>Calculated Site Specific Target Level for Soil</b>			
Csoil calculated source soil concentration (SSL, mg/kg) Cw*(partition term)*(dilution term)			7.4

- Cwt is based on the Drinking Water Standards and Health Advisories (EPA, 2000).
- H is from Table 3-2 of the Toxicological Profile for Polychlorinated Biphenyls (U.S. Department of Health & Human Services, 1995) adjusted to the dimensionless form (x 41).
- ks = koc x foc.
- koc is from the Superfund Chemical Data Matrix
- foc is from nearby SWMU13 sample H13SB018A (analytical results for total organic carbon is 8,400 mg/kg = 0.84% TOC).
- Sw is the measured length of the source area exceeding the SSL along the groundwater flow direction.
- d is calculated as  $d = (0.0112 L^2)^{0.5} + da(1 - e^{-L q_w / K_s da})$  or da, whichever is less.
- da is the minimum depth of the published saturated zone thickness for Zone G (USGS, 1999).
- i is calculated (1/1000) from groundwater contours presented in Figure 1-4 Groundwater Monitoring Report (CH2M-Jones, 2001)
- Ks is from the USGS Report *Hydrology and Simulation of Ground-Water Flow in the Surficial Aquifer System in the Area of Charleston Naval Base, North Charleston, South Carolina, 1995-97 (USGS, 1999)*.
- θw is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
- θv is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
- ρs is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
- qi is from the USGS Report *Hydrology and Simulation of Ground-Water Flow in the Surficial Aquifer System in the Area of Charleston Naval Base, North Charleston, South Carolina, 1995-97 (USGS, 1999)*.

## Data Validation Summary - Charleston Naval Complex - Zone H, AOC 709

TO: Sam Naik/CH2M HILL/ATL  
FROM: Herb Kelly/CH2M HILL/GNA  
DATE: September 18, 2001

The purpose of this memorandum is to present the results of the data validation process for the samples collected at AOC 709 and SWMU 17 in Zone H. The samples were collected on the dates of April 19 and May 8.

The specific samples and analytical fractions reviewed are summarized below in Table 1.

The Quality Control areas that were reviewed and the resulting findings are documented within each subsection that follows. The data were validated for compliance with the analytical method requirements. This process also included a review of the data to assess the accuracy, precision, and completeness based upon procedures described in the guidance documents such as the Environmental Protection Agency's (EPA's) *National Functional Guidelines for Inorganic Data Review* (EPA, 1994) and *National Functional Guidelines for Organic Data Review* (EPA, 1999). Quality assurance/quality control (QA/QC) summary forms and data reports were reviewed.

Samples were submitted to General Engineering Laboratories, Inc. (GEL) in Charleston, South Carolina. The samples collected on April 19, 2001, were submitted to GEL with the original request for analysis for semivolatile compounds following SW-846 Method 8270. The extracts were analyzed at a later date for PCBs following SW-846 Method 8082. The samples collected on May 8, 2001, were submitted with an original request of analysis following SW-846 Method 8082.

Sample results that were not within the acceptance limits were appended with a qualifying flag, which consisted of a single- or double-letter code that indicated a possible problem with the data. The qualifying flags originated during the data review and validation processes. These also include the secondary or the two-digit "sub-qualifier" flags. The secondary qualifiers provide the reasoning behind the assignment of a qualifier flag to the data. The secondary qualifiers are presented and defined below.

The following primary flags were used to qualify the data:

- [=] Detected. The analyte was analyzed for and detected at the concentration shown.
- [J] Estimated. The analyte was present but the reported value may not be accurate or precise.
- [U] Undetected. The analyte was analyzed for but not detected above the method detection limit.
- [UJ] Detection limit estimated. The analyte was analyzed for but qualified as not detected; the result is estimated.
- [R] Rejected. The data are not useable.

### Secondary Data Validation Qualifiers

<u>Code</u>	<u>Definition</u>
2S	Second Source
BL	Blank
BD	Blank Spike/Blank Spike Duplicate or (LCS/LCSD) Precision
BS	Blank Spike/LCS
CC	Continuing Calibration Verification
DL	Dilution
FD	Field Duplicate
HT	Holding Time
IB	In-Between (metals - B's → J's )
IC	Initial Calibration
IS	Internal Standard
LD	Lab Duplicate
LR	Concentration Exceeded Linear Range
MD	MS/MSD or LCS/LCSD Precision
MS	Matrix Spike/Matrix Spike Duplicate
OT	Other (see DV worksheet)
PD	Pesticide Degradation
PS	Post Spike
RE	Re-extraction/Re-analysis
SD	Serial Dilution
SS	Spiked Surrogate
TN	Tune

**Table 1 - Chemical Analytical Methods – Field and Quality Control Samples****TABLE 1**

Chemical Analytical Methods – Field and Quality Control Samples

Zone H, AOC 709

Charleston Naval Complex, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Date Collected	Matrix	Sample Type	Upper Depth	Lower Depth	SW802 PCBs
41929	HG38SB014	G38SB01401	41929001	05/08/01	SO	N	0	1	X
41929	HG38SB014	G38SB01402	41929002	05/08/01	SO	N	3	5	X
41929	HG38SB015	G38SB01501	41929003	05/08/01	SO	N	0	1	X
41929	HG38SB015	G38SB01502	41929004	05/08/01	SO	N	3	5	X
42353	H017SWB02	017SWB0201	42353001	04/19/01	SO	N	0	1	X
42353	H017SWB02	017SWB0202	42353002	04/19/01	SO	N	3	5	X
42353	H017SWT02	017SWT0201	42353003	04/19/01	SO	N	0	1	X
42353	H017SWT02	017SWT0202	42353004	04/19/01	SO	N	3	5	X
41930	FIELDQC	G38EB014L1	41930001	05/08/01	WQ	EB			X

**MATRIX CODE**

SO – Soil

WQ - Water QC Samples

**SAMPLE TYPE CODE**

EB - Equipment Blank

N - Native Sample

**ANALYSIS CODE**

PCBs - Polychlorinated Biphenyls

## Organic Parameters

### Quality Control Review

The following list represents the QA/QC measures that are typically reviewed during the data quality evaluation procedure for organic data.

- **Holding Times** – The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples** – Method blanks, equipment blanks, and trip blanks were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Surrogate Recoveries** – Surrogate compounds are added to each sample and the recoveries are used to monitor lab performance and possible matrix interference.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples** – Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **Lab Control Sample (LCS)** – This sample is a "controlled matrix", either laboratory reagent water or Ottawa sand, in which target compounds have been added prior to extraction/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Field Duplicate Samples** – These samples are collected to determine precision between a native and its duplicate. This information can only be determined when target compounds are detected.
- **GC/MS Tuning** – The mass spectrum of the tuning compound is evaluated for method compliance. The criteria are established to verify the proper mass assignment and mass resolution.
- **Initial Calibration** – The initial calibration ensures that the instrument is capable of producing acceptable qualitative and quantitative data for the compounds of interest.
- **Continuing Calibration** – The continuing calibration checks satisfactory performance of the instrument and its predicted response to the target compounds.
- **Internal Standards** – The internal standards (retention time and response) are evaluated for method compliance. The internal standards are used in quantitation of the target parameters and monitor the instrument sensitivity and response for stability during each analysis.
- **Confirmation** – If GCMS methodology is not initially used for analysis, SW-846 Method 8000 requires confirmation when the composition of samples is not well characterized. Therefore, even when the identification has been confirmed on a dissimilar column or detector, the agreement of the quantitative results on both columns is evaluated. For

pesticide and PCB analyses covered in this report, confirmation was performed using a dissimilar analytical column. The laboratory analyzed samples with a gas chromatograph (GC) utilizing simultaneous primary and confirmation data acquisition. Per SW-846 Method 8000, 40 percent RPD criteria was used as the acceptance limit.

## **Polychlorinated Biphenyls (PCBs) Analyses**

The QA/QC parameters for the PCBs analyses for all of the samples were within acceptable control limits, except as noted below.

### **Recoveries - Surrogate**

All surrogate recoveries were within acceptable quality control limits, except as noted below.

- The recoveries for Tetrachloro-*m*-xylene in sample G38SB01501 were 59 and 49 percent, respectively, for the two analytical columns. Although the recoveries were slightly below QC limits of 60-150, no flags were applied.
- The samples collected on April 19, 2001, were originally submitted for analysis of semivolatile compounds by SW-846 Method 8270. As a result, the surrogate compounds typically added for the PCB analysis were not added prior to extraction. However, the recoveries of the 8270 surrogate compounds were well within recovery limits, indicating acceptable extraction efficiency. Therefore, no flags were applied.

### **Calibrations**

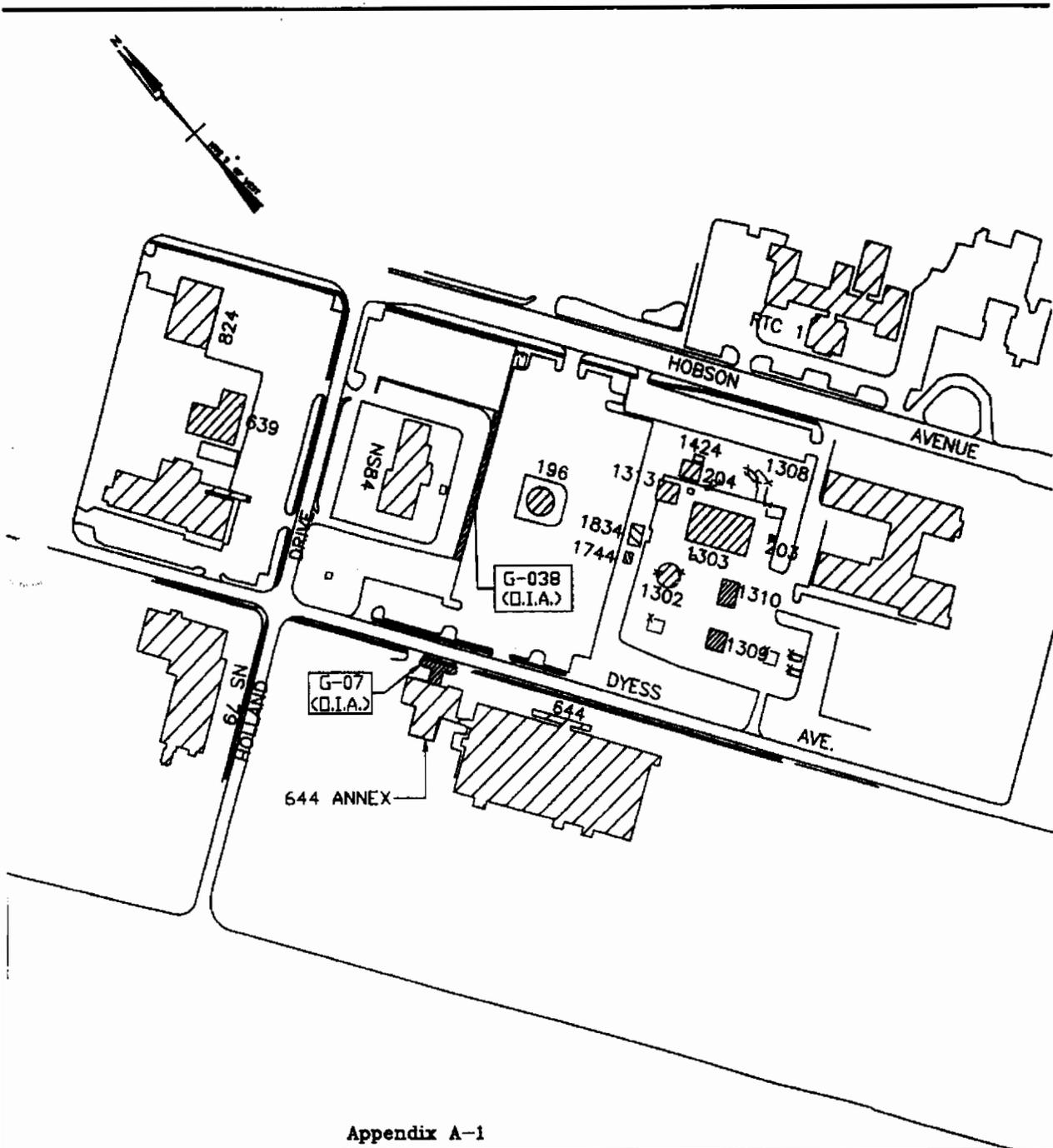
All initial and continuing calibration criteria were met except as noted below.

- The percent difference for Aroclor 1016 was 17.0 and 18.0 percent high on the two analytical columns. Aroclor 1016 was not detected in any associated sample; therefore, no flags were applied.

## **Conclusion**

A review of the analytical data submitted regarding the investigation of AOC 709 in Zone H at the Charleston Naval Complex, Charleston, South Carolina, by CH2M HILL has been completed. An overall evaluation of the data indicates that the sample handling, shipment, and analytical procedures have been adequately completed, and that the analytical results should be considered usable as qualified.

The analytical data had minor QC concerns, but no qualifying flags were applied to the analytical results. The validation review demonstrated that the analytical systems were generally in control and the data results can be used in the decision making process.



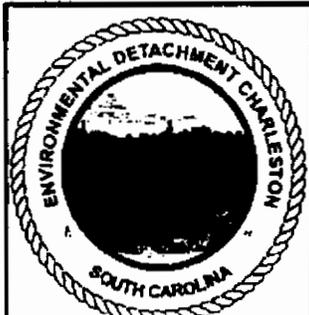
Appendix A-1

**LEGEND**

(O.I.A.) - OTHER IMPACTED AREA

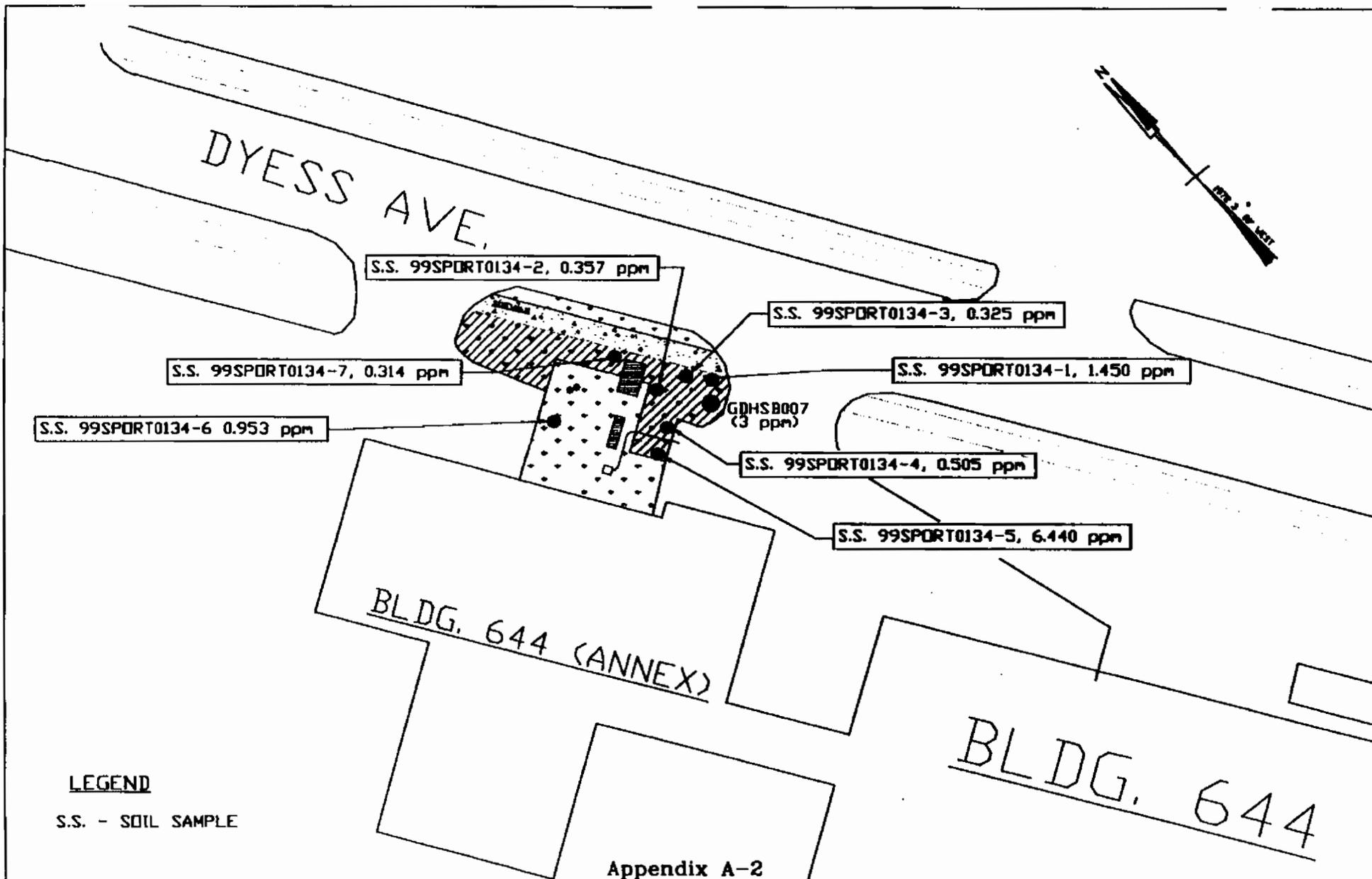


GRAPHIC SCALE



SPORTENVDETHASN  
 1899 North Hobson Ave.  
 North Charleston, SC 29405-2108  
 Ph. (803) 743-6777

Figure 1 - Zone H - Grid G07  
 OTHER IMPACTED AREAS  
 Charleston Naval Base  
 Charleston, SC



**LEGEND**

S.S. - SOIL SAMPLE



GRAPHIC SCALE

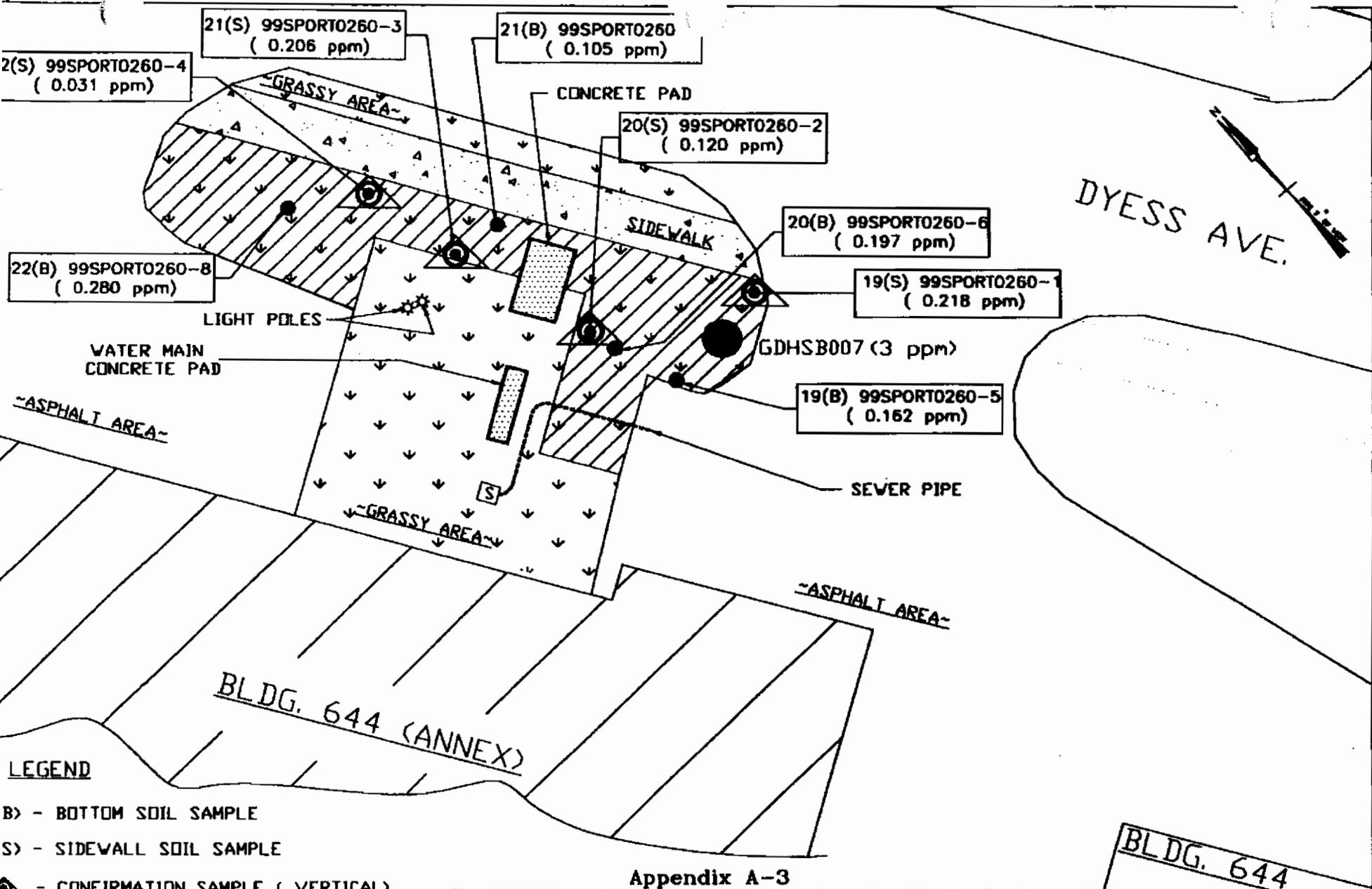


**SPORTENVDETHASN**  
 1899 North Hobson Ave.  
 North Charleston, SC  
 29405-2108  
 Ph. (803) 743-8777

**Figure 2 PCB DELINEATION SAMPLES**  
 Zone H Grid G07  
 BUILDING 644  
 Naval Base Charleston, SC

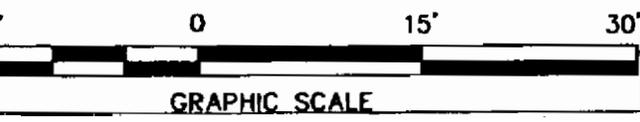
DWG DATE: 16 APR 99

DWG NAME: B-644\_2A



**LEGEND**

- B) - BOTTOM SOIL SAMPLE
- S) - SIDEWALL SOIL SAMPLE
- ⊙ - CONFIRMATION SAMPLE ( VERTICAL )
- ▨ - EXCAVATION AREA



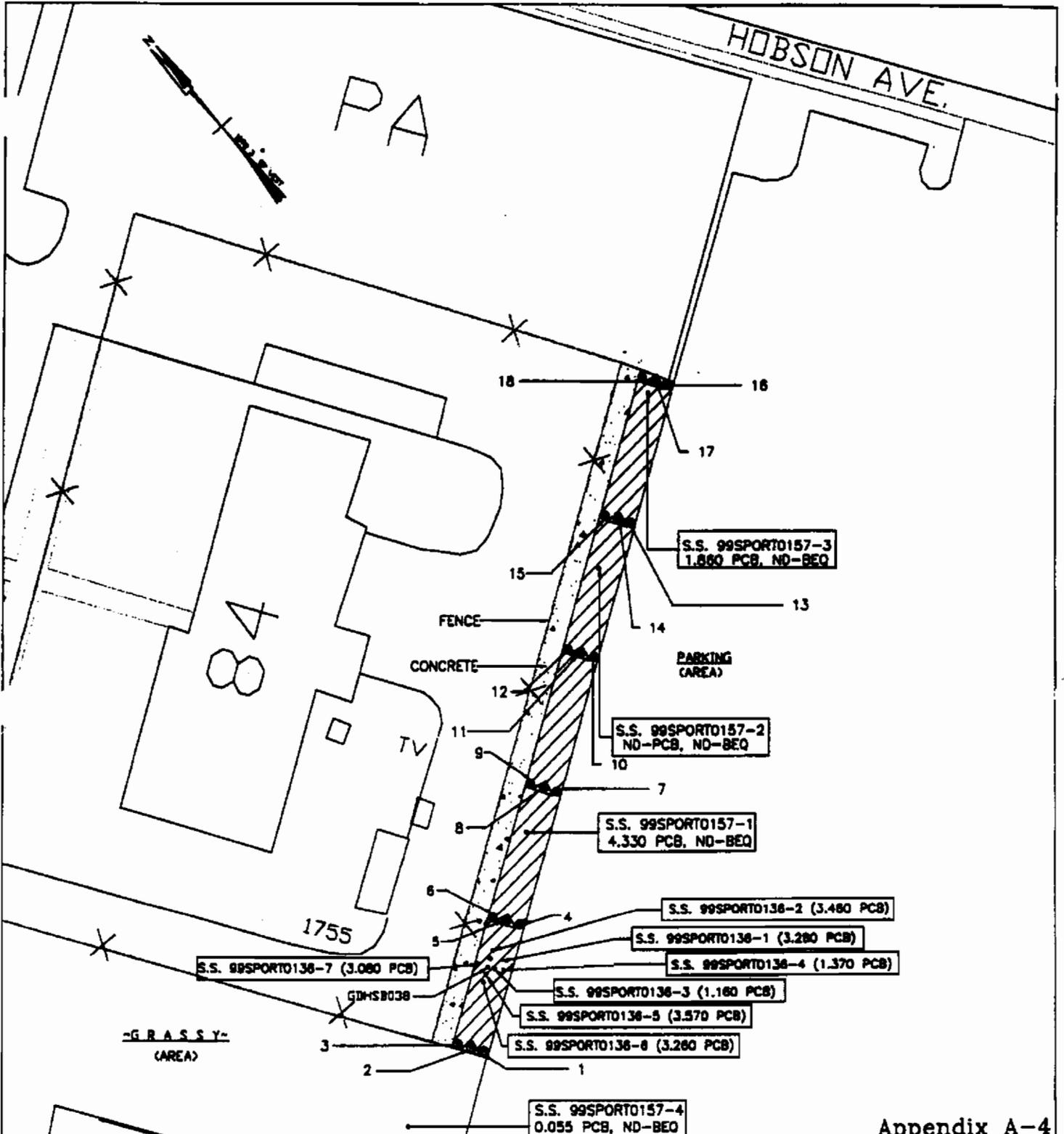
**Appendix A-3**



**SPORTENVDECHASN**  
 1899 North Hobson Ave.  
 North Charleston, SC  
 29405-2108  
 Ph. (803) 743-6777

**Figure 3 PCB CONFIRMATION SAMPLES**  
 Zone H Grid G07  
**BUILDING 644**  
 Naval Base Charleston, SC

DWG DATE: 24 SEP 99    DWG NAME: B-644\_3A



Appendix A-4

**LEGEND**

- S.S. - SOIL SAMPLE
- - CONFIRMATION SAMPLE (HORITZ)
- ▨ - EXCAVATION AREA
- ▲ - CONFIRMATION SAMPLE (VERT.)

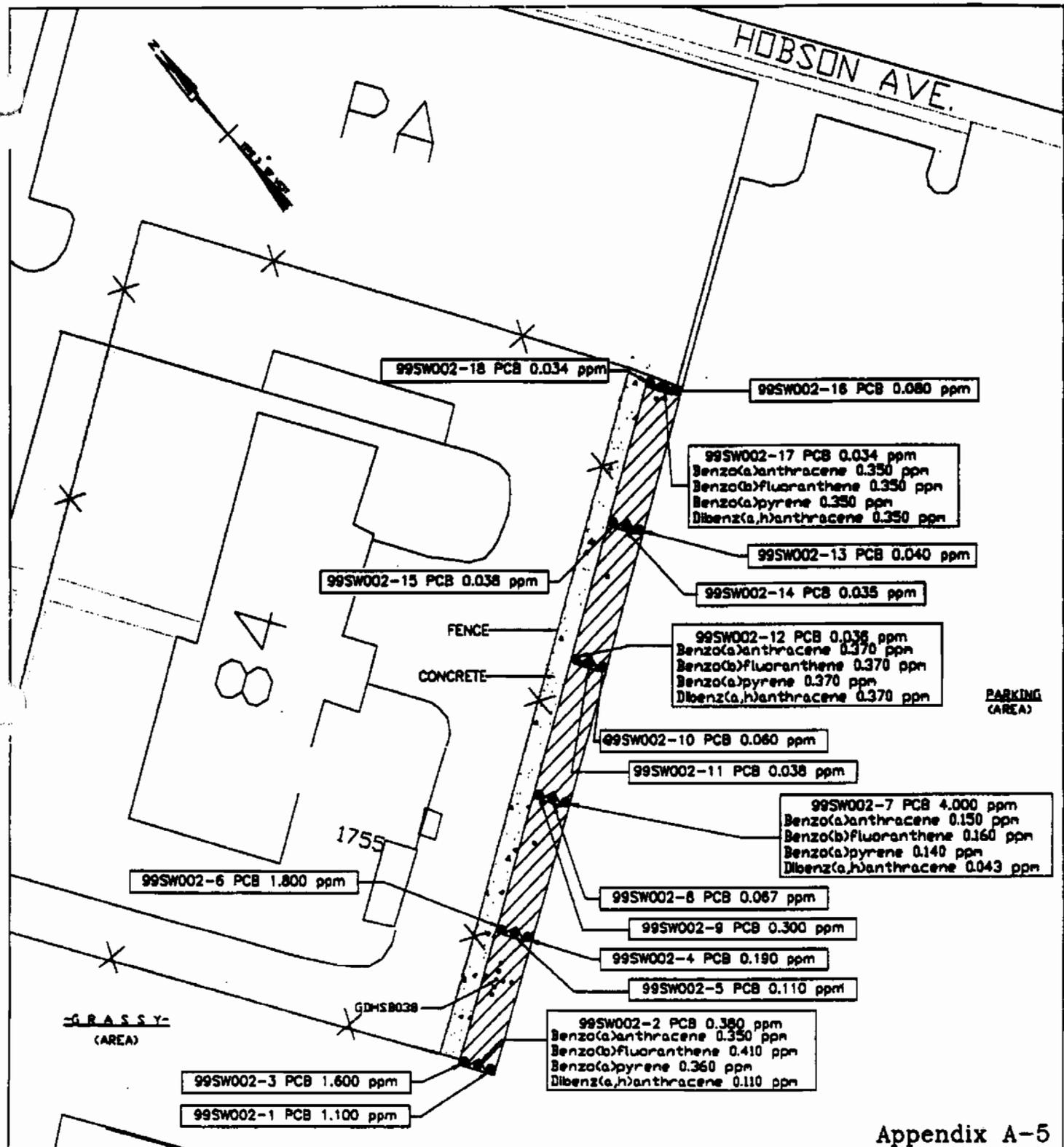
GRAPHIC SCALE



**SPORTENVDETCHASN**  
1899 North Hobson Ave.  
North Charleston, SC 29405-2108  
Ph. (803) 743-8777

**Figure 4 PCB DELINEATION SAMPLES**  
Zone H Grid G038  
BUILDING 84/1135  
Naval Base Charleston, SC

DWG DATE: 21 JUL 99 | DWG NAME: B-84\_4A

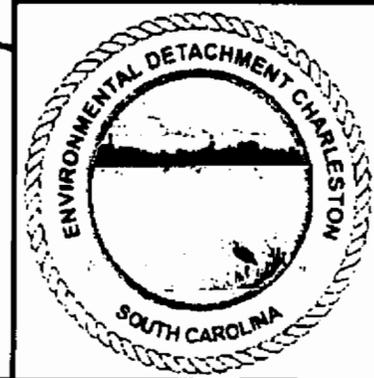


**Appendix A-5**

**LEGEND**

- - CONFIRMATION SAMPLE (HORIZ.)
- ▨ - EXCAVATION AREA
- ▲ - CONFIRMATION SAMPLE (VERT.)

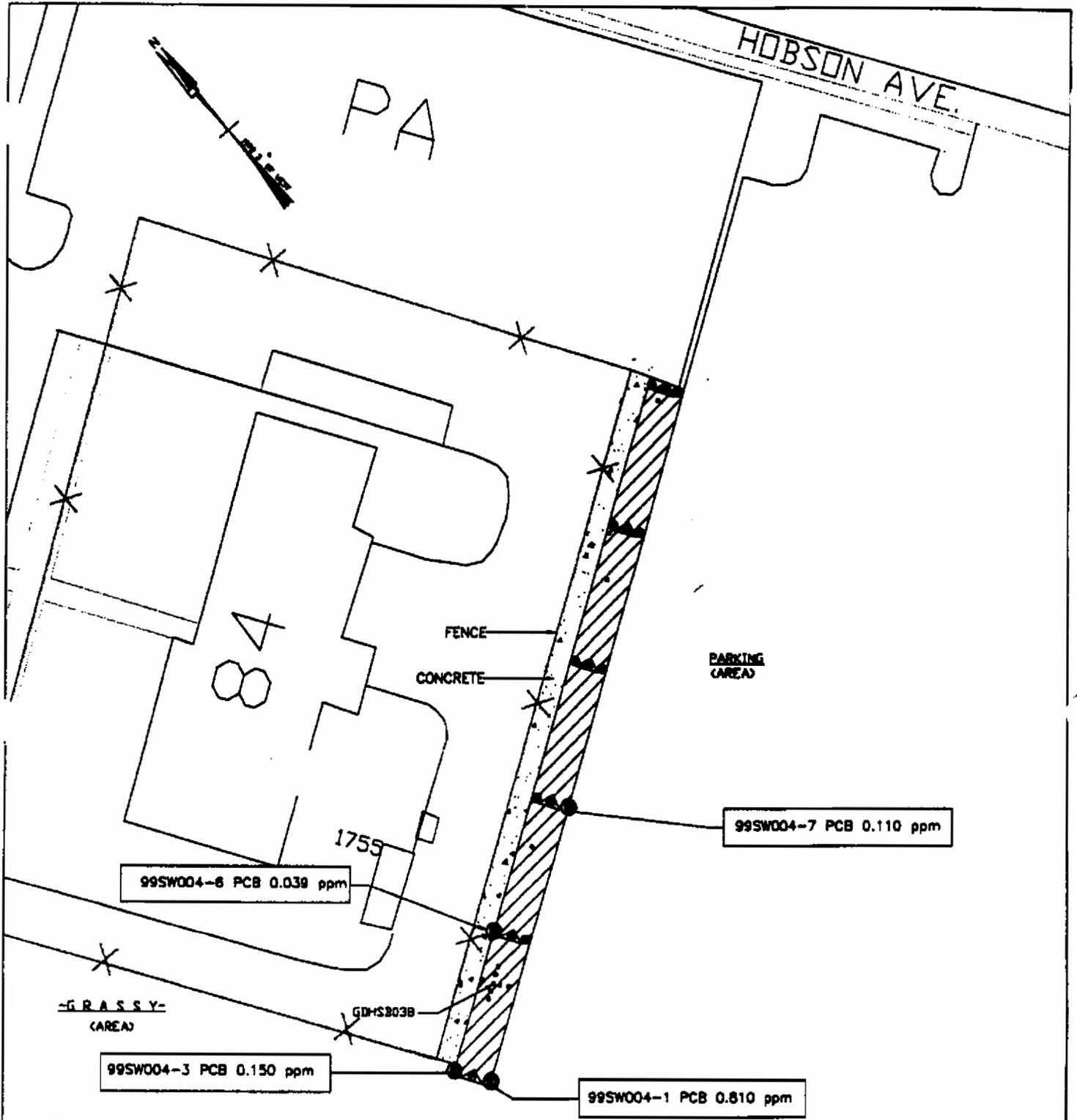
**GRAPHIC SCALE**



**SPORTENVDETCHASN**  
 1899 North Hobson Ave.  
 North Charleston, SC 29405-2108  
 Ph. (803) 743-8777

**Figure 5 PCB INITIAL EXCAVATION  
 Zone H Gird G038 Confirmation Samples  
 BUILDING 84/1135  
 Naval Base Charleston, SC**

**DWG DATE: 23 SEP 99 DWG NAME: B-84\_5A**



Appendix A-6

**LEGEND**

- - CONFIRMATION SAMPLE (HORIZ.)
- ▨ - EXCAVATION AREA
- ▲ - CONFIRMATION SAMPLE (VERT.)
- - FINAL CONFIRMATION SAMPLE (HORIZ.)

GRAPHIC SCALE



**SPORTENVDETHASN**  
 1899 North Hobson Ave.  
 North Charleston, SC 29405-2108  
 Ph. (803) 743-8777

**Figure 6 PCB FINAL EXCAVATION**  
 Zone H Gird G038 Confirmation Samples  
 BUILDING 84/1135  
 Naval Base Charleston, SC

DWG DATE: 23 SEP 99 DWG NAME: B-84\_6A

## 1 5.0 Summary of Information Related to Site 2 Closeout Issues

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3 Prior to issuing NFA status in the CNC RCRA CA permit for sites at CNC, the BCT agreed  
4 that the issues listed below should be addressed. Although this document is not intended to  
5 provide the rationale for changing the status of the sites being discussed to NFA, the  
6 following closeout strategies will be discussed in order to evaluate their relevance to the  
7 conclusion of the RFI:

- 8 • Presence of metals (inorganics) in groundwater
- 9 • Potential linkage of SWMU/AOC to SWMU 37 (investigated sanitary sewers)
- 10 • Potential linkage of SWMU/AOC to AOC 699 (investigated stormwater sewers)
- 11 • Potential linkage of SWMU/AOC to AOC 504 (investigated railroad lines)
- 12 • Potential migration pathways to surface water bodies (Zone J)
- 13 • Potential contamination associated with OWSs
- 14 • Land Use Controls

### 15 5.1 Presence of Inorganics in Groundwater

16 No groundwater monitoring wells were considered necessary at this site during the RFI  
17 (EnSafe, 1996). No metals were detected in soils above residential RBCs or SSLs at the two  
18 grid locations HG38SB007 and HG38SB038 during the RFI. There is no reason to believe or  
19 data to suggest that inorganics in groundwater are an issue at this site. Therefore, inorganics  
20 in groundwater do not warrant further investigation at this site.

### 21 5.2 Potential Linkage to Surrounding Site Features

22 With respect to linkage of individual sites to sanitary sewers, stormwater sewers, and  
23 railroad lines, reference is made to the *Final Zone L RFI Report* (EnSafe, 1998). The  
24 investigated segments of Zone L encompass the following:

- 25 • Specific sections of the sanitary sewer system that may have been exposed to hazardous  
26 materials (SWMU 37)
- 27 • Specific sections of the storm water collection system likely exposed to hazardous  
28 materials (AOC 699)

- 1 • Sections of the railroad line system where known or suspected releases of solid or  
2 hazardous waste contaminants have occurred (AOC 504)

3 The *Zone J Draft RCRA Facility Investigation Report* (EnSafe, 2000) is also referenced in this  
4 RFI Report Addendum. Zone J encompasses investigated surface water bodies on CNC.

### 5 **5.3 Potential Linkage to SWMU 37, Investigated Sanitary** 6 **Sewers at the CNC**

7 No industrial activities are known to have been conducted at this site and there is no reason  
8 to believe that any linkage to the sanitary sewer exists. Further evaluation of this issue is not  
9 warranted.

### 10 **5.4 Potential Linkage to AOC 699, Investigated Storm Sewers at** 11 **the CNC**

12 Potential linkage of a SWMU or AOC to a storm sewer refers to the possibility of a  
13 groundwater plume at a SWMU or AOC migrating into a storm sewer from which it would  
14 subsequently migrate to the water bodies around the CNC, or to the presence of a cross  
15 connection between the sanitary sewer and storm sewer.

16 No industrial activities are known to have been conducted at this site and there is no reason  
17 to believe that any linkage to the storm sewer exists. Further evaluation of this issue is not  
18 warranted.

### 19 **5.5 Potential Linkage to AOC 504, Investigated Railroad Lines** 20 **at the CNC**

21 There is no known linkage between AOC 709(H) and the investigated railroad lines of AOC  
22 504. Therefore, further evaluation of this issue is not warranted.

### 23 **5.6 Potential Migration Pathways to Surface Water Bodies at** 24 **the CNC (Zone J Investigation)**

25 The nearest water body is the Cooper River, which is approximately 750 feet to the north of  
26 AOC 709(H). Two potential migration pathways from the site to surface water are overland  
27 flow via storm water runoff and subsurface flow via groundwater. Because the site and the  
28 area between the site and the river are paved with asphalt, thereby covering the low-level

1 PCBs detected in the soil, further evaluation of a potential pathway for contaminant  
2 migration via storm water runoff is not warranted.

3 In addition, the soil-to-groundwater pathway is considered invalid because there has been  
4 no subsurface migration of site constituents to the groundwater as a result of site activities.

## 5 **5.7 Potential Contamination in Oil/Water Separators (OWSs)**

6 The issue of potential contamination of OWSs refers to the possible presence of an OWS that  
7 has not yet been investigated at a SWMU or AOC as part of the RCRA or underground  
8 storage tank (UST) process.

9 Neither the RCRA Facility Assessment (RFA) nor the RFI refer to the presence or possible  
10 presence of an OWS at AOC 709(H). Furthermore, there is no visual evidence of an OWS at  
11 this site. Therefore, further evaluation of this issue at AOC 709(H) is not warranted.

## 12 **5.8 Land Use Control Management Plan**

13 The RFI Report Addendum arrived at a UCL<sub>95</sub> concentration for PCBs of 0.11 mg/kg, which  
14 is well below the target concentration of 1 mg/kg for unrestricted land use. Therefore, land  
15 use controls are not necessary for AOC 709(H).



## 1 **6.0 Recommendations**

---

2 AOC 709(H) was investigated during the initial RFI (EnSafe, 1996) as a result of detections  
3 of PCBs above the residential RBC of 0.32 mg/kg at grid locations HGDHSB007 and  
4 HGDHSB038 in Zone H. Supplemental soil sampling was conducted during the RFI at 19  
5 different locations at the site. Subsequent to the RFI effort, the Navy Detachment conducted  
6 an IM which included excavation of 144 cubic yards of soil at grid sample locations  
7 HGDHSB007 and HGDHSB038 to remove soils with PCB concentrations above 1 mg/kg.  
8 Two sample locations, which showed elevated PCB concentrations, were resampled by  
9 CH2M-Jones during May 2001 to verify the PCB concentrations at these two isolated  
10 locations. Analytical results at these two locations showed low-level PCB concentrations  
11 slightly over 1 mg/kg in the upper interval. A majority of the other RFI sampling locations  
12 which encompass the areas around the grid locations HGDHSB007 and HGDHSB038 show  
13 either very low detections of PCBs or no detections above the laboratory detection limits.  
14 The detected subsurface soil PCBs were below the EPA target concentration of 1 mg/kg for  
15 high occupancy areas (EPA, 2001b).

16 A UCL<sub>95</sub> calculation was performed for the site using the PCB concentrations detected in the  
17 surface soils. This calculation resulted in a UCL<sub>95</sub> estimate of 0.11 mg/kg, which is well  
18 below the EPA target concentration of 1 mg/kg for unrestricted land use. Therefore no land  
19 use controls are necessary at this site, and the site is suitable for unrestricted land use.

20 Based on this information, no further investigation or removal action is warranted at this  
21 site. Therefore, NFA status under the CNC RCRA permit is recommended for this site.

## 1 **7.0 References**

---

- 2 CH2M-Jones, LLC. *Interim Measure Work Plan, Delineation Sampling and Soil Removal, Grid*  
3 *Areas G7 & G38, AOC 709H, Zone H.* April 2001.
- 4 CH2M-Jones, LLC. *Corrective Measures Study Work Plan, Solid Waste Management Unit 17,*  
5 *Zone H.* May 2001.
- 6 EnSafe Inc. *Zone H RFI Report, NAVBASE Charleston.* Revision 0. July 1996.
- 7 EnSafe Inc. *Final Zone L RFI Report.* 1998.
- 8 EnSafe Inc. *Zone J Draft RCRA Facility Investigation Report.* 2000.
- 9 South Carolina Research Authority, Environmental Enterprise Group (SCRA, EEG; formerly  
10 Navy Detachment). *Completion Report, Interim Remedial Measure for Zone H Grids G07 & G038,*  
11 *Charleston Naval Complex.* December 1999.
- 12 U.S. Environmental Protection Agency. *Code of Federal Regulations, 40 CFR 761.125*  
13 *PCB Remediation Waste.* 2001a.
- 14 U.S. Environmental Protection Agency. *Code of Federal Regulations, 40 CFR 761.61.4*  
15 *Subchapter R – Toxic Substances Control Act, Part 761, PCB Remediation Waste.* 2001b.
- 16 United States Geological Survey, Hydrology and Simulation of Ground-Water Flow in the  
17 Surficial Aquifer System in the Area of Charleston Naval Base, North Charleston, South  
18 Carolina, 1995-97 (USGS, 1999).
- 19 U.S. Environmental Protection Agency. Environmental Services Division *Standard Operating*  
20 *Procedures and Quality Assurance Manual (ESDSOPQAM).* 1996a.
- 21 U.S. Environmental Protection Agency. *Soil Screening Guidance: User's Guide.* Office of Solid  
22 Waste and Emergency Response (OSWER). 1996b.
- 23 U.S. Environmental Protection Agency. *Soil Screening Guidance: Technical Background*  
24 *Document.* Office of Solid Waste and Emergency Response (OSWER). 1996c.

**Charleston Naval Complex**  
**AOC 709(H), Zone H**  
**Analytical Data Summary**  
**IM Soil Sampling May 2001**

10/02/2001 6:41 AM

	<b>StationID</b>	HG38SB014		HG38SB014		HG38SB015		HG38SB015	
	<b>SampleID</b>	G38SB01401 (0-1ft)		G38SB01402 (3-5ft)		G38SB01501 (0-1ft)		G38SB01502 (3-5ft)	
	<b>RFI Sampling Location</b>	HG38SB005		HG38SB005		HG38SB011		HG38SB011	
	<b>DateCollected</b>	05/08/2001 10:50		05/08/2001 10:55		05/08/2001 11:05		05/08/2001 11:10	
	<b>DateAnalyzed</b>	5/17/01		5/17/01		5/17/01		5/18/01	
	<b>SDGNumber</b>	41929		41929		41929		41929	
<b>Parameter</b>	<b>Units</b>								
PCB-1016 (Arochlor 1016)	ug/kg	35.9	U	39.3	U	161	U	163	U
PCB-1221 (Arochlor 1221)	ug/kg	35.9	U	39.3	U	161	U	163	U
PCB-1232 (Arochlor 1232)	ug/kg	35.9	U	39.3	U	161	U	163	U
PCB-1242 (Arochlor 1242)	ug/kg	35.9	U	39.3	U	161	U	163	U
PCB-1248 (Arochlor 1248)	ug/kg	35.9	U	39.3	U	161	U	163	U
PCB-1254 (Arochlor 1254)	ug/kg	72.9	U	79.8	U	161	U	163	U
PCB-1260 (Arochlor 1260)	ug/kg	15.1	J	4.6	J	1040	=	1380	=