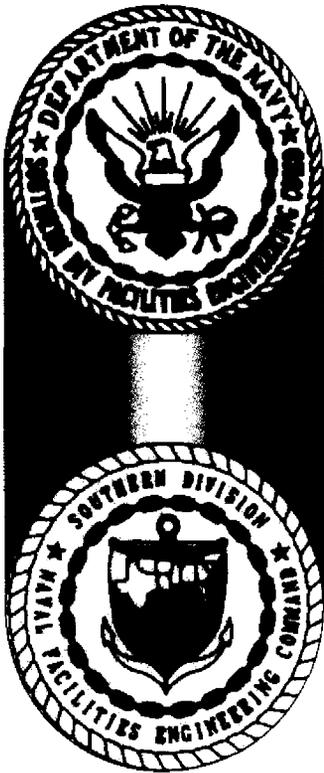


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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT
ADDENDUM AND CORRECTIVE MEASURE STUDY WORK PLAN FOR SOLID WASTE
MANAGEMENT UNIT 87 (SWMU 87) ZONE E CNC CHARLESTON SC
1/16/2003
CH2M HILL

RFI REPORT ADDENDUM

RFI Report Addendum and CMS Work Plan Combined SWMU 87, Zone E



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

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

CH2M Jones

January 2003

*Revision 0
Contract N62467-99-C-0960*



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January 16, 2003

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 0) – Combined SWMU 87,
Zone E

Dear Mr. Scaturo:

Enclosed please find two copies of the RFI Report Addendum and CMS Work Plan (Revision 0) for Combined SWMU 87 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 contact him at 770/604-9182, extension 255, if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

cc: Tim Frederick/Gannett Fleming, Inc., w/att
Dann Spariosu/USEPA, w/att
Rob Harrell/Navy, w/att
Gary Foster/CH2M HILL, w/att

RFI REPORT ADDENDUM

RFI Report Addendum and CMS Work Plan Combined SWMU 87, Zone E



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

SUBMITTED TO
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PREPARED BY
CH2M-Jones

January 2003

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

Certification Page for RFI Report Addendum and CMS Work Plan (Revision 0) – Combined SWMU 87, Zone E

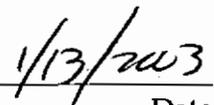
I, Dean Williamson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

P.E. No. 21428



Dean Williamson, P.E.



Date

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28		Charleston Navy Shipyard (January 1, 1962)	

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	CAP	Corrective action plan
10	CMS	Corrective measures study
11	CNC	Charleston Naval Complex
12	COC	Chemical of concern
13	COPC	Chemical of potential concern
14	CSI	Confirmatory Sampling Investigation
15	DAF	Dilution attenuation factor
16	DCA	Dichloroethane
17	DCB	Dichlorobenzene
18	DCE	Dichloroethene
19	DET	Environmental Detachment Charleston
20	EnSafe	EnSafe Inc.
21	EPA	U.S. Environmental Protection Agency
22	FRE	Fixed-point risk evaluation
23	HHRA	Human Health Risk Assessment
24	HI	Hazard index
25	ILCR	Incremental lifetime cancer risk
26	IM	Interim measure
27	LUC	Land use control
28	MCL	Maximum contaminant level
29	MCS	Media cleanup standard
30	$\mu\text{g}/\text{kg}$	Micrograms per kilogram

1 **Acronyms and Abbreviations, Continued**

2	$\mu\text{g/L}$	Micrograms per liter
3	mg/kg	Milligrams per kilogram
4	NAVBASE	Naval Base
5	NFA	No further action
6	NFI	No further investigation
7	OWS	Oil/water separator
8	RAO	Remedial action objective
9	RBC	Risk-based concentration
10	RCRA	Resource Conservation and Recovery Act
11	RFI	RCRA Facility Investigation
12	RG0	Remedial goal option
13	RI	Remedial investigation
14	SCDHEC	South Carolina Department of Health and Environmental Control
15	SSL	Soil screening level
16	SVOC	Semivolatile organic compound
17	SWMU	Solid waste management unit
18	TCB	Trichlorobenzene
19	UST	Underground storage tank
20	VOC	Volatile organic compound

1 1.0 Introduction

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

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

11 In April 2000, CH2M-Jones was awarded a contract to provide environmental investigation
12 and remediation services at the CNC. This submittal has been prepared by CH2M-Jones to
13 complete the RCRA Facility Investigation (RFI) for Solid Waste Management Unit (SWMU)
14 87 and 172, and Area of Concern (AOC) 564 in Zone E of CNC. These sites are located at the
15 intersection of Fourth Street and Avenue A South and were investigated together due to
16 their close proximity to each other. These sites will be collectively referred to in this
17 document as Combined SWMU 87. The location of this combined site in Zone E is shown in
18 Figure 1-1. Figure 1-2 shows an aerial photograph of the site within Zone E.

19 1.1 Background

20 1.1.1 SWMU 87

21 SWMU 87 is a former less-than-90-day accumulation area that was once part of the
22 Charleston Naval Shipyard hazardous waste management system. Located north of
23 Building 80, the unit is a metal building with an asphalt foundation. Wastes were
24 accumulated in closed, palletized 55-gallon drums and palletized plastic bags. The
25 accumulation area was taken out of service in March 1994 and is currently a paved area.

26 1.1.2 SWMU 172

27 SWMU 172 consists of a former steam cleaning area north of Building 80. Steam cleaning
28 was performed on various types of equipment including small engines, generators, and
29 construction equipment. The unit consisted of a concrete-paved area designed with curbing
30 and sloping surfaces to drain liquids into two storm drains located between the concrete-

1 paved area and Building 80, on the south side of the steam-cleaning area. This unit did not
2 have an enclosure or a roof. Currently, no steam-cleaning operations exist at SWMU 172
3 and the paved area is being used to store equipment.

4 **1.1.3 AOC 564**

5 AOC 564 consisted of a 300-gallon oil/water separator (OWS) north of Building 80.
6 Wastewater from machining and parts-cleaning in Building 80 drained onto a sloped
7 asphalt ramp, which fed into an exterior drain connected to the OWS. At the time of the
8 RFI, the OWS had been in operation for more than 25 years. Based on information from a
9 visual site inspection conducted by CH2M-Jones as part of the Environmental Baseline
10 Survey for Transfer (EBST) during April 2001, it appears that this OWS no longer exists.

11 A review of historic drawings for this site shows that railroad lines have been located north
12 of the site since 1909. Currently, railroad lines still exist north and east of the site.

13 Materials of concern indicated in the *Final Zone E RFI Work Plan* (EnSafe Inc. [Ensafe]/Allen
14 & Hoshall, 1995) at Combined SWMU 87 were paint, mercury, anti-freeze, and petroleum
15 hydrocarbons. Materials of concern identified for SWMU 172 and AOC 564 were petroleum
16 hydrocarbons. This area of Zone E is zoned M2 (marine industrial). The CNC RCRA Permit
17 identified Combined SWMU 87 as requiring confirmatory sampling investigation (CSI).

18 The RFI activities initially conducted by the Navy/EnSafe team were described in the *Zone*
19 *E RFI Report, Revision 0* (EnSafe, 1997). Regulatory review was conducted on this document
20 and draft responses to the comments from SCDHEC were prepared by the Navy/EnSafe
21 team. These comments and responses are included in Appendix A of this document.

22 **1.2 Purpose of the RFI Report Addendum**

23 This submittal has been prepared by CH2M-Jones to complete the RFI for Combined
24 SWMU 87 in Zone E of the CNC. This RFI Report Addendum includes a summary of
25 previous RFI investigations and conclusions, as well as additional investigations conducted
26 at Combined SWMU 87 by CH2M-Jones during 2002.

27 This RFI Report Addendum also discusses the results of the additional investigations, the
28 refinement of chemicals of potential concern (COPCs) and chemicals of concern (COCs),
29 various closeout issues, existing site conditions, and surrounding land use. Contained
30 within Section 8.0 of this document is a focused Corrective Measures Study (CMS) Work
31 Plan. This CMS Work Plan presents the steps that will address the CMS recommended for

1 soil and groundwater COCs, identified for the Combined SWMU 87 site following the RFI
2 and additional investigations.

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

- 5 • Status of the RFI
- 6 • Presence of metals (inorganics) in groundwater
- 7 • Potential linkage to SWMU 37, Investigated Sanitary Sewer at the CNC
- 8 • Potential linkage to AOC 699, Investigated Storm Sewer at the CNC
- 9 • Potential linkage to AOC 504, Investigated Railroad Lines at the CNC
- 10 • Potential linkage to surface water bodies (Zone J)
- 11 • Potential contamination associated with oil/water separators (OWSs)
- 12 • Relevance or need for land use controls (LUCs) at the site

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

15 **1.3 Report Organization**

16 This RFI Report Addendum consists of the following sections, including this introductory
17 section:

18 **1.0 Introduction** – Presents the purpose of the report and background information relating
19 to the RFI Report Addendum.

20 **2.0 Summary of RFI Conclusions for Combined SWMU 87** – Summarizes the conclusions
21 from the RFI investigations and risk evaluations for Combined SWMU 87 as presented
22 in *the Zone E RFI Report, Revision 0*.

23 **3.0 Interim Measures and UST/AST Removals at Combined SWMU 87** – Provides
24 information regarding any interim measures (IMs) or tank removal activities performed
25 at the site.

26 **4.0 Summary of Additional Investigations** – Summarizes the additional information
27 collected after completion of the RFI.

28 **5.0 COPC/COC Refinement** – Provides further evaluation of COPCs based on RFI and
29 additional data to assess them as COCs.

1 **6.0 Summary of Information Related to Site Closeout Issues** – Discusses the various site
2 closeout issues that the BRAC Cleanup Team (BCT) agreed to evaluate prior to site
3 closeout.

4 **7.0 Recommendations** – Provides recommendations for proceeding with a corrective
5 measures study (CMS) for this site.

6 **8.0 CMS Work Plan** - Provides a CMS Work Plan for assessing applicable corrective
7 measures to address the COCs identified in the site soil and groundwater.

8 **9.0 References** – Lists the references used in this document.

9 **Appendix A** – Contains responses to SCDHEC comments for Combined SWMU 87 from the
10 *Zone E RFI Report, Revision 0* (EnSafe, 1997).

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

13 **Appendix C** - Contains a copy of the Underground Storage Tank (UST) Removal Report for
14 UST 38-1.

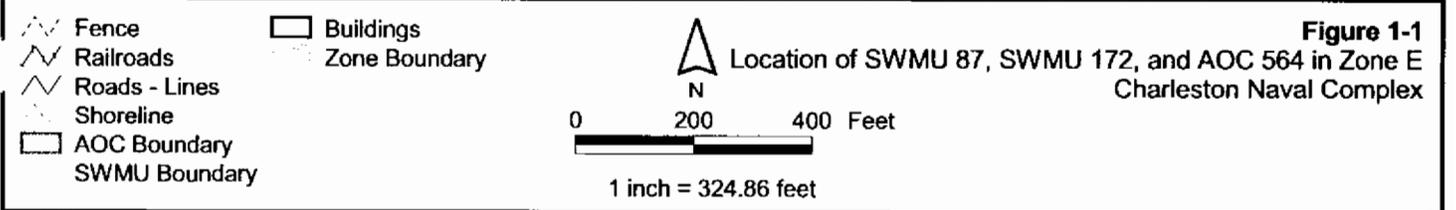
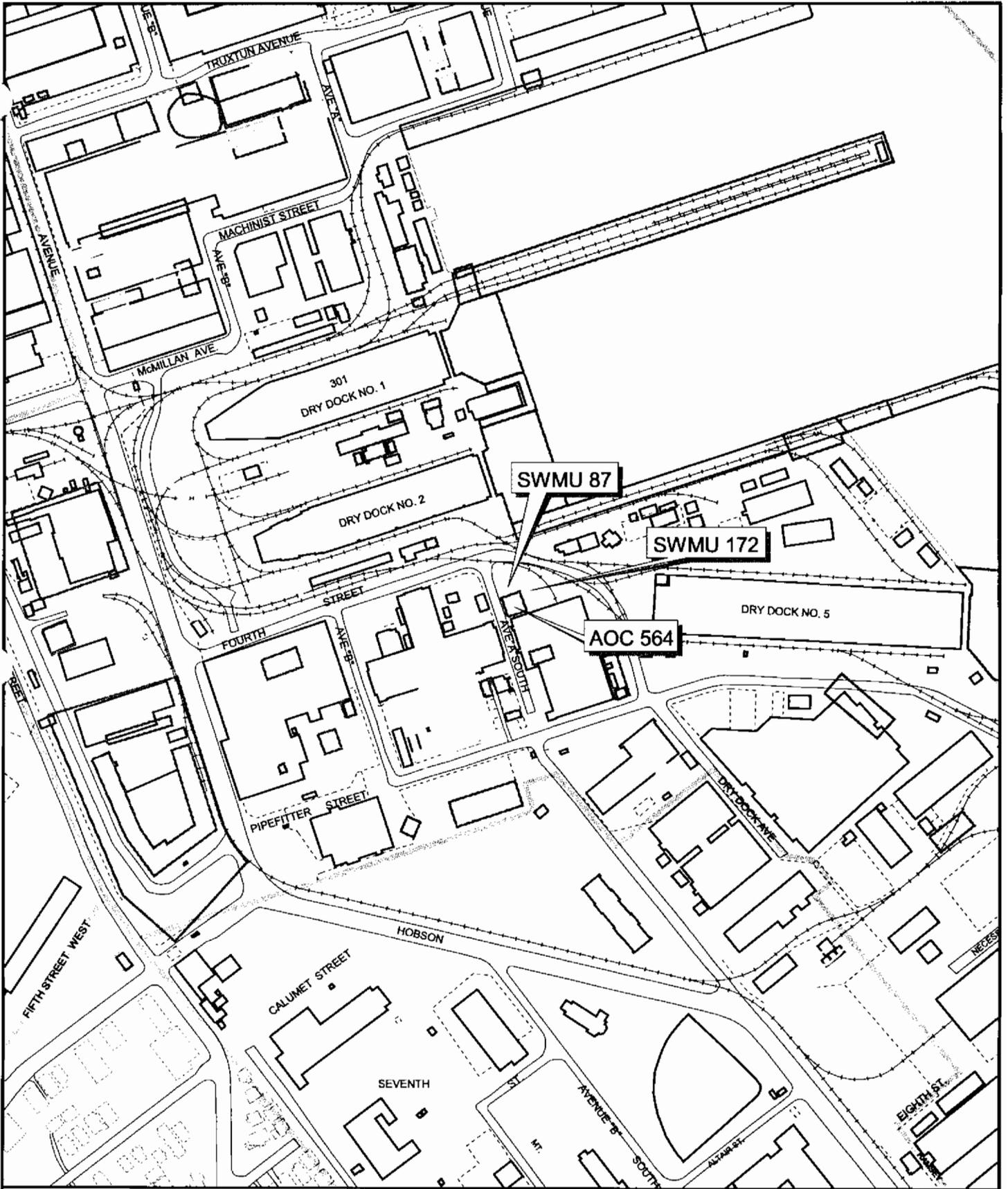
15 **Appendix D** – Contains the analytical results summary for additional soil and groundwater
16 sampling conducted by CH2M-Jones during January and February 2002.

17 **Appendix E** – Contains data validation summaries for the additional soil and groundwater
18 sampling conducted by CH2M-Jones during January and February 2002.

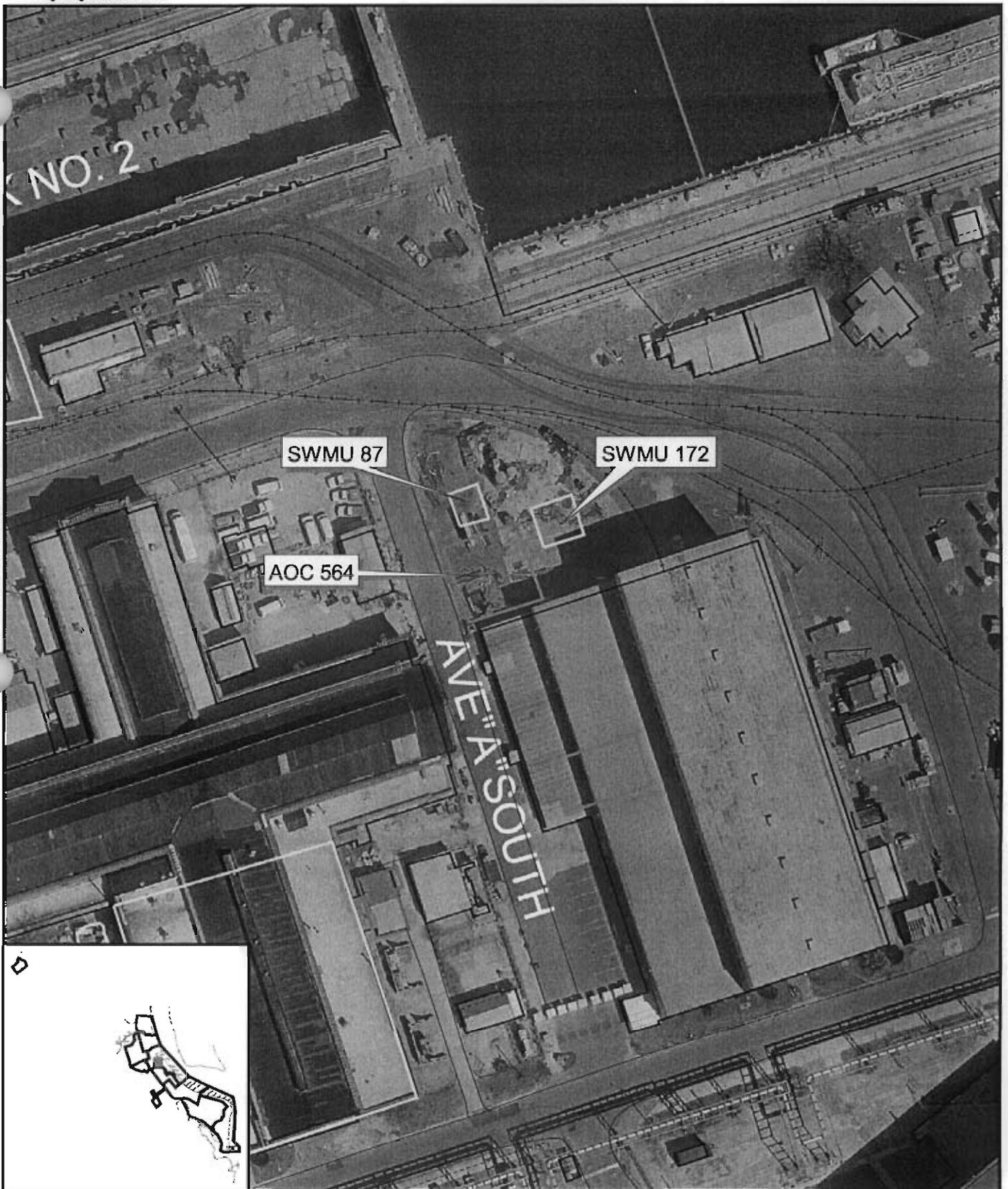
19 **Appendix F** - Contains a table showing site-specific soil screening level (SSL) calculations.

20 **Appendix G** - Includes the site location map from the Public Works Map of the Charleston
21 Navy Shipyard, dated January 1, 1962, which depicts the presence of railroad lines at the
22 site.

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



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



Fence	Buildings	N	Aerial Photograph of SWMU 87, SWMU 172, and AOC 564 Charleston Naval Complex
Railroads	Zone Boundary		
Roads		0 60 120 Feet	
Shoreline			
AOC Boundary		1 inch = 84 feet	
SWMU Boundary			

2.0 Summary of RFI Conclusions for Combined SWMU 87

This section summarizes the results and conclusions from the soil and groundwater investigations conducted at Combined SWMU 87, which were reported in the *Zone E RFI Report, Revision 0* (EnSafe, 1997).

As part of the Zone E RFI, soil and groundwater investigations were conducted at Combined SWMU 87 during 1995 and 1997. The RFI report presented the results of these investigations and conclusions concerning contamination and risk, as summarized in the following sections. A further evaluation of COCs at this combined site is provided in Section 5.0. Figure 2-1 shows soil, sediment, and groundwater sampling locations.

2.1 Soil Sampling and Analysis

During the RFI, soil was sampled during one sampling event at Combined SWMU 87. Ten surface samples and 10 co-located subsurface soil samples were collected from the area north of Building 80. These boring locations were identified as E087SB001, E172SB001 through E172SB006, and E564SB001 through E564SB003. All samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, cyanides, pesticides/polychlorinated biphenyls (PCBs) and organotins. Two surface soil samples were selected as duplicates and analyzed for a more comprehensive list of VOCs and SVOCs, as well as herbicides, hexavalent chromium, organophosphorus pesticides, and dioxins.

2.1.1 Surface Soil Results

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

Detected concentrations of organic and inorganic analytes exceeding their respective criteria in surface soils were as follows:

- 1 • **VOCs:** No VOCs exceeded the screening criteria in surface soils.
- 2 • **SVOCs:** No SVOCs exceeded the screening criteria in surface soils.
- 3 • **Inorganics:** Among detected inorganic analytes, only arsenic exceeded the industrial RBC
- 4 of 3.8 milligrams per kilogram (mg/kg) and the Zone E BRC of 23.9 mg/kg. The
- 5 exceedance occurred at one location (E087SB001) with a detection of 66.5 mg/kg.
- 6 • **PCBs:** No PCBs were detected above laboratory detection limits.
- 7 • **Pesticides:** No pesticides exceeded the screening criteria.
- 8 • **Dioxins:** Dioxin concentrations calculated as TCDD-equivalents (TEQs) were below the
- 9 COPC screening criterion of 1,000 nanograms per kilogram (ng/kg) used in the *Zone E*
- 10 *RFI Report, Revision 0*.

11 **2.1.2 Subsurface Soil Results**

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

16 Detected concentrations of organic and inorganic compounds from subsurface soil samples
17 are as follows:

- 18 • **VOCs:** Among detected VOCs, chloromethane was detected in one lower-interval sample
- 19 from soil boring E564SB001 at 7.0 µg/kg, above its SSL of 6.6 µg/kg.
- 20 • **SVOCs:** No SVOCs exceeded COPC screening criteria.
- 21 • **Inorganics:** No inorganic chemicals exceeded COPC screening criteria.
- 22 • **PCBs:** No PCBs were detected above laboratory detection limits.
- 23 • **Pesticides:** No pesticides exceeded the COPC screening criteria.

24 **2.2 Groundwater Sampling and Analysis**

25 During the RFI, two shallow and one deep groundwater monitoring wells were installed.
26 Four groundwater sampling events were conducted during 1996 and 1997. During the first
27 sampling event, samples were submitted for analysis for VOCs, SVOCs, metals, cyanide,
28 pesticides, PCBs, chlorides, total dissolved solids (TDS), and sulfates. During the remaining
29 three sampling events, groundwater samples were analyzed for VOCs, SVOCs, and metals
30 only. Figure 2-1 shows the groundwater monitoring well locations at the site.

1 During the RFI, detections in groundwater samples were compared with the EPA Region III
2 tap water RBCs, maximum contaminant levels (MCLs), and the Zone E BRCs for shallow
3 and deep aquifers.

4 **2.2.1 Shallow Groundwater Results**

5 The RFI report discussed the following detections in the shallow groundwater samples at
6 this site:

- 7 • **VOCs:** Two VOCs were detected at concentrations above screening criteria. 1,2-
8 dichloroethene (1,2-DCE) (total) was detected at 37.0 micrograms per liter ($\mu\text{g}/\text{L}$) in well
9 E172GW001. This detection exceeded the tap water RBC of 5.5 $\mu\text{g}/\text{L}$, but was below the
10 MCL of 70 $\mu\text{g}/\text{L}$. Chlorobenzene was detected at 110.0 $\mu\text{g}/\text{L}$ in well E172GW001, above
11 the tap water RBC of 3.9 $\mu\text{g}/\text{L}$ and the MCL of 100 $\mu\text{g}/\text{L}$.
- 12 • **SVOCs:** One SVOC (1,4-dichlorobenzene [1,4-DCB]) was detected at 6.0 $\mu\text{g}/\text{L}$ in well
13 E172GW001. This detection exceeded its tap water RBC of 4.8 $\mu\text{g}/\text{L}$, but was below the
14 MCL of 75 $\mu\text{g}/\text{L}$.
- 15 • **Inorganics:** Among detected inorganic analytes, only iron was detected above its COPC
16 screening criteria at 6,100 $\mu\text{g}/\text{L}$ in well E172GW001 and at 2,200 $\mu\text{g}/\text{L}$ in well
17 E172GW002, which exceeded both its secondary MCL of 300 $\mu\text{g}/\text{L}$ and the tap water
18 RBC of 1,100 $\mu\text{g}/\text{L}$ (HI=0.1). No shallow groundwater BRC was developed for iron in
19 Zone E during the RFI.

20 **2.2.2 Deep Groundwater Results**

21 The *Zone E RFI Report, Revision 0* discussed the following detections in the deep
22 groundwater at the site:

- 23 • **VOCs:** No VOCs were detected above COPC screening criteria.
- 24 • **SVOCs:** No detections of SVOCs occurred above laboratory detection limits.
- 25 • **Inorganics:** Among detected inorganic analytes, arsenic, iron and manganese exceeded at
26 least one of the COPC screening criteria:
 - 27 – Arsenic was detected at a concentration of 18.5 $\mu\text{g}/\text{L}$ in well E172GW02D, which
28 exceeded both the arsenic tap water RBC of 0.045 $\mu\text{g}/\text{L}$ and the Zone E BRC for
29 arsenic of 16.4 $\mu\text{g}/\text{L}$, but did not exceed the MCL of 50 $\mu\text{g}/\text{L}$.
 - 30 – Iron was detected at a concentration of 7,040 $\mu\text{g}/\text{L}$ in well E172GW02D, which
31 exceeded its tap water RBC of 1,100 $\mu\text{g}/\text{L}$. No primary MCL or deep groundwater
32 BRC has been established for iron.

- 1 – Manganese was detected at a concentration of 1,240 µg/L, exceeding both the tap
2 water RBC of 84.0 µg/L and the deep groundwater BRC of 869 µg/L. No primary
3 MCL has been established for manganese.

4 **2.3 Sediment Sampling and Analysis**

5 The RFI Work Plan for SWMU 172 proposed the collection of one sediment sample from the
6 a stormwater drop inlet at the site. Accordingly, one sediment sample was collected at the
7 location shown in Figure 2-1 and analyzed for VOCs, SVOCs, metals, cyanides, pesticides,
8 PCBs, and organotins. The RFI reported that there were no detections in this sample of
9 VOCs, SVOCs, pesticides, PCBs, or inorganics above screening criteria. The stormwater
10 drain inlet at this location is shown in Figure B-2 (included in Appendix B), which depicts
11 the stormwater system in this area.

12 **2.4 RFI Human Health Risk Assessment (HHRA)**

13 The RFI used a fixed-point risk evaluation (FRE) approach at this site. The FRE considered
14 site resident and site worker scenarios. The detailed risk assessment for the Combined
15 SWMU 87 site is presented in Sections 10.11.10.2 and 10.11.10.5 of the *Zone E RFI Report*,
16 *Revision 0*, and is summarized below.

17 **2.4.1 Soils**

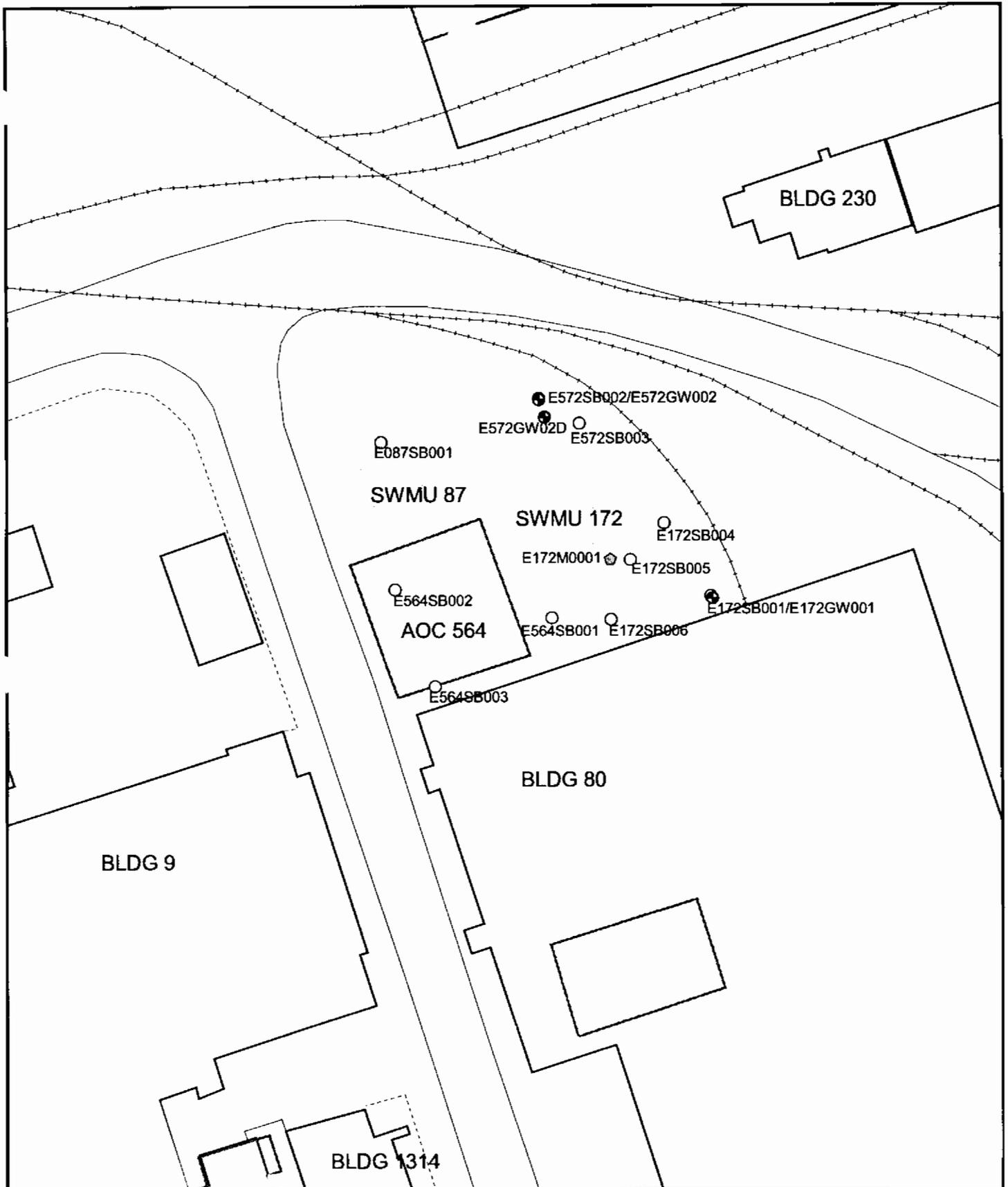
18 For the unrestricted (i.e., residential) future land use scenario, arsenic, benzo[a]pyrene
19 equivalents (BEQs), and dieldrin in surface soils were retained as COCs. For the
20 commercial/industrial reuse scenario, arsenic in surface soils was retained as a COC. The
21 FRE did not identify any COCs in subsurface soil at this site.

22 **2.4.2 Groundwater**

23 The FRE for Combined SWMU 87 retained 1,2-DCE (total), 1,4-DCB, and chlorobenzene as
24 COCs in shallow groundwater, and arsenic and manganese as COCs in deep groundwater.

25 **2.5 RFI Conclusions and Recommendations**

26 The *Zone E RFI Report, Revision 0* recommended that No Further Action (NFA) is required
27 for soils at the site, and that a CMS be conducted for shallow groundwater COCs (1,2-DCE
28 (total), 1,4-DCB, and chlorobenzene) and deep groundwater COCs (arsenic and manganese)
29 at Combined SWMU 87.



- Groundwater Well
- ◊ Sediment Sample
- Soil Boring
- Fence
- Railroads
- Roads
- AOC Boundary
- SWMU Boundary
- Buildings
- Zone Boundary

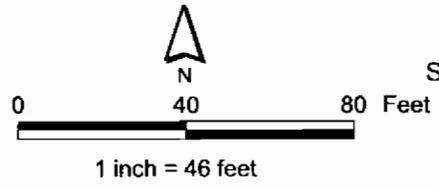


Figure 2-1
RFI Sampling Locations
SWMU 87, SWMU 172, and AOC 564
Charleston Naval Complex

1 **3.0 Interim Measures and UST/AST Removals at** 2 **Combined SWMU 87**

3 **3.1 Interim Measures**

4 There were no IMs conducted at Combined SWMU 87.

5 **3.2 UST/AST Removals**

6 UST 38-1 was located at this site. This UST was a gravity-fed, waste oil collection tank for an
7 OWS, which was located north of Building 80. UST 38-1 was closed and removed by the
8 Navy Environmental Detachment (DET) between January 29, 1997 and March 3, 1997. No
9 corrosion, holes, or pitting was observed on the tank. During excavation the tank was
10 punctured and approximately one quart of product was released. The product was collected
11 with absorbent pads and the small quantity of oil-impacted soil was removed and disposed
12 offsite. A copy of the UST removal report is included in Appendix C.

13 In a letter dated December 5, 1997, SCDHEC deferred closure of this UST site until the RFI
14 for AOC 564 is completed. A copy of this letter is included in Appendix C.

4.0 Summary of Additional Investigations

This section summarizes the results and conclusions from the soil and groundwater investigations conducted at Combined SWMU 87 by CH2M-Jones during January and February 2002 to further delineate the nature and extent of COPCs in soil and groundwater. These investigations were conducted to further assess the presence of COPCs at the site. Soil and groundwater samples were collected and analyzed to delineate the following chemicals.

Surface Soils

- VOCs
- Pesticides (primarily dieldrin)
- Metals (antimony, arsenic, and chromium)

Subsurface Soils

- VOCs

Shallow Groundwater

- VOCs

4.1 Soil Sampling and Analysis

A sampling and analysis plan (SAP) for Combined SWMU 87 was prepared by CH2M-Jones and submitted to SCDHEC. The soil and groundwater sampling were conducted during January and February 2002.

Twelve additional surface soil samples and thirteen co-located subsurface soil samples were collected from areas surrounding previous RFI borings which showed chemical concentrations exceeding screening criteria, in order to further delineate VOCs, SVOCs, pesticides, and metals exceedances. These borings were identified as E172SB008 through E172SB019. Samples E172SB008 through E172SB010 were analyzed for dieldrin, antimony, arsenic, and chromium. Samples E172SB011 through E172SB014 were analyzed for VOCs, SVOCs, and chromium. Samples E172SB015 through E172SB019 were analyzed for VOCs only. At these new sampling locations, surface soil was sampled from a depth interval of 0 to 1 foot below land surface (ft bls) and subsurface soil was sampled from a depth interval of 3 to 5 ft bls. Figure 4-1 shows the soil sampling locations from this sampling event.

1 4.1.1 Surface Soil Results

2 Because this site is located within Zone E and is expected to remain in use for industrial
3 activities, the BCT has agreed that the RFI delineation must be completed to industrial RBC
4 values or background levels. Surface soil detections of VOCs were evaluated against the
5 EPA Region III industrial and residential RBCs (with a hazard index HI=0.1 for
6 noncarcinogens) and SSLs (using a DAF=1). Surface soil detections of SVOCs and inorganic
7 chemicals were evaluated against the EPA Region III residential RBCs (HI=0.1 for
8 noncarcinogens) and SSLs (with a DAF=10). Additionally, inorganic chemicals were
9 compared with the range of background concentrations in Zone E grid samples. Table 4-1
10 shows chemicals detected above laboratory detection limits in these samples.

11 Detected concentrations of organic and inorganic analytes in surface soil exceeding their
12 respective COPC screening criteria were as follows:

- 13 • **VOCs:**

- 14 – Two surface soil samples showed detections of 1,2-DCE above its SSL (DAF=1) of
15 0.02 mg/kg (E172SB015 at 0.022 mg/kg and E172SB016 at 0.023 mg/kg).
- 16 – Two surface soil samples showed detections of vinyl chloride above its SSL (DAF=1)
17 of 0.0007 mg/kg (E172SB015 at 0.0026 mg/kg and E172SB018 at 0.0018 mg/kg).
- 18 – Seven surface soil samples showed methylene chloride detections above its SSL of
19 0.001 mg/kg, with detections ranging from 0.0014 mg/kg to 0.0036 mg/kg.

- 20 • **SVOCs:** No SVOCs exceeded their respective screening criteria.

- 21 • **Pesticides:** No pesticides exceeded their respective screening criteria.

- 22 • **Inorganics:** No inorganics exceeded their respective screening criteria.

23 Detections exceeding screening criteria are shown in Figure 4-1.

24 4.1.2 Subsurface Soil Results

25 Subsurface soil detections were compared with generic SSLs using a DAF=1 for VOCs and
26 DAF=10 for other organics. Subsurface soil detections of inorganic chemicals were
27 compared with SSLs (DAF=10), and the range of background concentrations in Zone E grid
28 samples. Table 4-2 shows chemicals detected above laboratory detection limits in these
29 samples.

30 Detected concentrations of organic and inorganic analytes in subsurface soil exceeding their
31 respective criteria were as follows:

- 32 • **VOCs:**

- 1 – Chlorobenzene was detected in one sample above its screening criteria. It was
- 2 detected in E172SB015 at a concentration of 0.31 mg/kg, which exceeds its SSL
- 3 (DAF=1) of 0.07 mg/kg.
- 4 – Methylene chloride was detected in seven sample locations above its SSL(DAF=1) of
- 5 0.001 mg/kg, with concentrations ranging from 0.0016 mg/kg to 0.0027 mg/kg.
- 6 – 1,2-DCE was detected at 0.19 mg/kg at E572SB015 above its SSL (DAF=1) of 0.02
- 7 mg/kg.
- 8 – Trichloroethene (TCE) was detected in one sample at E172SB015 at 0.0738 mg/kg
- 9 above its SSL (DAF=1) of 0.003 mg/kg.
- 10 – Vinyl chloride was detected in two samples at E172SB016 at 0.0011 mg/kg and at
- 11 E172SB018 at 0.0019 mg/kg above its SSL (DAF=1) of 0.0007 mg/kg.
- 12 • **SVOCs:** No SVOCs exceeded their respective screening criteria.
- 13 • **Pesticides:** No pesticides exceeded their respective screening criteria.
- 14 • **Inorganics:** No inorganics exceeded their respective screening criteria.

15 Detections exceeding screening criteria are shown in Figure 4-1.

16 The validated analytical results and data validation summaries from this sampling event

17 are included in Appendices D and E.

18 **4.2 Groundwater Sampling and Analysis**

19 As part of the additional investigation conducted in January and February 2002, one

20 existing monitoring well, E172GW001, was resampled and three direct-push technology

21 (DPT) groundwater probes were installed downgradient of existing site wells in order to

22 further delineate VOCs in groundwater. These groundwater probe samples were identified

23 as E172GP001 through E172GP003. Figure 4-2 shows groundwater sampling locations and

24 Table 4-3 shows chemicals detected above laboratory detection limits in these samples.

25 Detected concentrations of VOCs in groundwater exceeding their respective criteria were as

26 follows:

- 27 • **Vinyl Chloride:** Vinyl chloride was detected in two samples above its screening criteria.
- 28 Vinyl chloride was detected in the sample from existing well E172GW001 at a
- 29 concentration of 2.3 µg/L, and in the sample from DPT groundwater probe E172GP002
- 30 at a concentration of 4.4 µg/L. Both detections exceed the MCL of 2 µg/L.

31 Detections exceeding screening criteria are shown in Figure 4-2.

1 **4.3 COPC Summary**

2 Based on the additional sampling and analysis, several VOCs were identified as COPCs for
3 surface soil (1,2-DCE, methylene chloride, and vinyl chloride), subsurface soil
4 (chlorobenzene ,1,2-DCE, methylene chloride and TCE), and shallow groundwater (vinyl
5 chloride). These COPCs are further evaluated in Section 5.0 to assess whether they should
6 be considered COCs.

TABLE 4-1
 Summary of Detections in Surface Soil Samples- January 2002 Sampling
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
Volatile Organic Compounds							
1,1-DCA	172SB015	0.0198	=	780	20,000	1	NA
	172SB016	0.0152	=				
	172SB018	0.0028	J				
1,2-DCE (total)	172SB015	0.022	=	70	18,000	0.02	NA
	172SB016	0.023	=				
	172SB018	0.0053	=				
	172SB019	0.0005	J				
1,3-DCB	172SB015	0.0010	J	7	1,800	1	NA
1,4-DCB	172SB011	0.0005	J	27	240	1	NA
	172SB013	0.0005	J				
	172SB015	0.0016	J				
	172SB016	0.0005	J				
	172SB017	0.0003	J				
	172SB018	0.0003	J				
	172SB019	0.0003	J				
Acetone	172SB011	0.232	=	780	20,000	0.8	NA
	172SB012	0.0189	=				
	172SB013	0.0424	=				
	172SB014	0.105	=				
	172SB015	0.0716	=				
	172SB017	0.0186	=				
	172SB018	0.304	=				
	172SB019	0.0153	=				
Chlorobenzene	172SB015	0.0013	J	160	41,000	0.07	NA
cis-1,2-DCE	172SB015	0.022	=	78	2,000	0.02	NA
	172SB016	0.023	=				
	172SB018	0.0053	=				

TABLE 4-1

Summary of Detections in Surface Soil Samples- January 2002 Sampling

RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
cis-1,2-DCE	172SB019	0.0005	J	78	2,000	0.02	NA
Ethylbenzene	172SB016	0.0007	J	780	20,000	0.7	NA
MEK (2-Butanone)	172SB011	0.0109	J	4700	120,000	0.4	NA
	172SB013	0.0053	J				
	172SB015	0.0038	J				
	172SB016	0.011	J				
Methylene Chloride	172SB011	0.0016	J	85	760	0.001	NA
	172SB012	0.0036	J				
	172SB013	0.0028	J				
	172SB014	0.0009	J				
	172SB015	0.0031	J				
	172SB016	0.0025	J				
	172SB017	0.0016	J				
	172SB018	0.0014	J				
	172SB019	0.0022	J				
PCE	172SB018	0.0021	J	12	110	0.003	NA
Toluene	172SB011	0.0006	J	1,600	41,000	0.6	NA
	172SB013	0.0005	J				
	172SB015	0.0006	J				
	172SB016	0.0005	J				
	172SB017	0.0003	J				
	172SB018	0.0003	J				
	172SB019	0.0003	J				
TCE	172SB016	0.0006	J	58	520	0.003	NA
	172SB018	0.0005	J				
Vinyl chloride	172SB015	0.0026	J	0.43	3.8	0.0007	NA
	172SB018	0.0018	J				

TABLE 4-1

Summary of Detections in Surface Soil Samples- January 2002 Sampling

RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
m+p Xylene	172SB015	0.0017	J	16,000		10	NA
	172SB016	0.0019	J				
o-Xylene	172SB015	0.0017	J	16,000		9	NA
	172SB016	0.0006	J				
Xylenes, Total	172SB015	0.0034	J	16,000		100	NA
	172SB016	0.0024	J				
Semivolatile Organic Compounds							
1,2-DCB	172SB015	0.0273	=	700	18,000	8.5	NA
1,4-DCB	172SB012	0.0509	J	27	240	1	NA
Anthracene	172SB013	0.01	J	2,300	61,000	6,000	NA
Fluoranthene	172SB011	0.0837	J	310	82,000	2150	NA
	172SB013	0.124	J				
Naphthalene	172SB013	0.0094	J	160	41,000	42	NA
Pyrene	172SB011	0.0790	J	230	61,000	2100	NA
	172SB013	0.138	J				
BEQs							
	E172SB011	0.3217		0.087	0.78	NA	1.34
	E172SB012	0.317					
	E172SB013	0.3172					
	E172SB014	0.2116					
Pesticides							
p,p'-DDD	172SB008	0.0025	J	2.7	24	8	NA
	172SB009	0.0025	J				
p,p'-DDE	172SB008	0.0034	J	1.9	17	30	NA
	172SB009	0.0038	J				
	172SB010	0.0245	J				
p,p'-DDT	172SB008	0.004	J	1.9	17	16	NA

TABLE 4-1

Summary of Detections in Surface Soil Samples- January 2002 Sampling
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
p,p'-DDT	172SB009	0.0042	J	1.9	17	16	NA
	172SB010	0.0242	J				
Inorganics							
Arsenic	172SB008	3.59	=	0.43	3.8	14.5	0.95 - 68
	172SB009	3.91	=				
	172SB010	10.4	=				
Chromium, Total	172SB008	29.2	=	23	610	19	2.3 - 567
	172SB009	47.7	=				
	172SB010	79.1	=				
	172SB011	59.6	=				
	172SB012	51.3	=				
	172SB013	39.5	=				
	172SB014	43.9	=				

Concentrations in bold and outlined within the table indicate an exceedance of the appropriate screening criteria.

= Indicates that the analyte was detected at the concentration shown.

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.

U Indicates that the concentration was not detected.

UJ Indicates that the concentration was not detected and is estimated.

NA Not Applicable

TABLE 4-2
 Summary of Detections in Subsurface Soil Samples- January 2002 Sampling
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Station ID	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
Volatile Organic Compounds							
1,1-DCA	172SB015	0.106	J	780	20,000	1	NA
	172SB016	0.013	=				
	172SB018	0.0013	J				
1,2-DCE (total)	172SB015	0.19	J	70	18,000	0.02	NA
	172SB016	0.017	=				
	172SB018	0.001	J				
1,3-DCB	172SB015	0.0965	J	7	1,800	1	NA
	172SB016	0.0008	J				
1,4-DCB	172SB013	0.0005	J	27	240	1	NA
	172SB014	0.0003	J				
	172SB015	0.212	J				
	172SB016	0.0018	J				
	172SB017	0.0002	J				
	172SB018	0.0003	J				
	172SB019	0.0002	J				
Acetone	172SB011	0.0113	=	780	20,000	0.8	NA
	172SB012	0.0324	=				
	172SB014	0.0838	=				
	172SB015	0.619	J				
	172SB016	0.138	=				
	172SB017	0.0349	=				
	172SB018	0.0383	=				
Carbon Disulfide	172SB012	0.0021	J	780	20,000	2	NA
Chlorobenzene	172SB015	0.31	J	160	41,000	0.07	NA
	172SB016	0.0037	J				
cis-1,2-DCE	172SB015	0.19	J	78	NA	0.02	NA
	172SB016	0.0170	=				

TABLE 4-2
 Summary of Detections in Subsurface Soil Samples- January 2002 Sampling
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Station ID	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
cis-1,2-DCE	172SB018	0.001	J	78	NA	0.02	NA
Ethylbenzene	172SB016	0.0003	J	780	20,000	0.7	NA
MEK (2-Butanone)	172SB016	0.0076	J	4700	120,000	0.4	NA
Methylene Chloride	172SB012	0.0027	J	85	760	0.001	NA
	172SB013	0.0024	J				
	172SB014	0.0023	J				
	172SB016	0.0022	J				
	172SB017	0.0017	J				
	172SB018	0.0016	J				
	172SB019	0.0016	J				
PCE	172SB014	0.0004	J	12	110	0.003	NA
Toluene	172SB011	0.0003	J	1600	41,000	0.6	NA
	172SB013	0.0005	J				
	172SB014	0.0004	J				
	172SB015	0.0516	J				
	172SB016	0.0008	J				
TCE	172SB015	0.0738	J	58	520	0.003	NA
Vinyl chloride	172SB016	0.0011	J	0.43	3.8	0.0007	NA
	172SB018	0.0019	J				
m+p Xylene	172SB016	0.0009	J	16,000	41,000	10	NA
o-Xylene	172SB016	0.0003	J	16,000	41,000	9	NA
Xylenes, Total	172SB016	0.0012	J	16,000	41,000	100	NA
Semivolatile Organic Compounds							
1,2,4-TCB	172SB012	0.0068	J	78	2,000	2.5	NA
1,2-DCB	172SB015	1.89	=	700	18,000	8.5	NA
	172SB016	0.0172	=				

TABLE 4-2
 Summary of Detections in Subsurface Soil Samples- January 2002 Sampling
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Station ID	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
1,4-DCB	172SB012	0.0509	J	27	240	1	NA
2-Chlorophenol	172SB012	0.0113	J	39	1,000	2	NA
2-Methylnaphthalene	172SB012	0.0075	J	160	4,100	1.1	NA
3-Methylphenol/4-Methylphenol (mp-Cresol)	172SB012	0.0113	J	390	10,000	20	NA
Acenaphthene	172SB012	0.0082	J	470	12,000	285	NA
Anthracene	172SB012	0.011	J	2300	61,000	6,000	NA
Benzyl Alcohol	172SB012	0.0193	J	2300	61,000	44	NA
Carbazole	172SB012	0.0124	J	32	290	0.3	NA
Dibenzofuran	172SB012	0.0085	J	31	820	3.8	NA
Di-n-octylphthalate	172SB012	0.0153	J	160	4,100	5,000	NA
Diphenylamine	172SB012	0.0114	J	200	5,100	13	NA
Fluoranthene	172SB011	0.0127	J	310	82,000	2150	NA
	172SB012	0.0157	J				
	172SB014	0.0115	J				
Fluorene	172SB012	0.009	J	310	8,200	230	NA
Hexachlorobenzene	172SB012	0.0098	J	0.4	3.6	1	NA
Pyrene	172SB011	0.0112	J	230	6,100	2,100	NA
	172SB012	0.0119	J				
	172SB014	0.0114	J				
BEQs							
	E172SB011	0.3111	=	0.87	0.78	NA	1.4
	E172SB012	0.2579	=				
	E172SB013	0.2487	=				
	E172SB014	0.2629	=				
Pesticides							

TABLE 4-2
 Summary of Detections in Subsurface Soil Samples- January 2002 Sampling
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Station ID	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Zone E Range of Background Concentrations
p,p'-DDD	172SB009	0.0025	J	2.7	24	8	NA
p,p'-DDE	172SB009	0.003	J	1.9	17	30	NA
p,p'-DDT	172SB009	0.0037	J	1.9	17	16	NA
Inorganics							
Arsenic	172SB008	7.95	=	0.43	3.8	14.5	0.83 - 26
	172SB009	4.58	=				
	172SB010	2.96	=				
Chromium, Total	172SB008	40.6	=	23	610	19	1.6 - 75
	172SB009	49.3	=				
	172SB010	13.8	=				
	172SB011	27.3	=				
	172SB012	15.3	=				
	172SB013	21.3	=				
	172SB014	21.1	=				

Concentrations in bold and outlined within the table indicate an exceedance of the appropriate screening criteria.

= Indicates that the analyte was detected at the concentration shown.

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.

U Indicates that the concentration was not detected.

UJ Indicates that the concentration was not detected and is estimated.

NA Not Applicable

TABLE 4-3
 Detected Concentrations from Groundwater Samples - January 2002 Sampling
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (µg/L)	Qualifier	EPA Region III Tap Water RBC	MCL
1,1-DCA	E172GP00118	0.8	J	80	NA
	E172GP00218	0.38	J		
1,2-DCB	E172GP00218	1.0	J	55	600
1,2-DCE (Total)	E172GP00218	4.2	J	5.5	70
	E172GP0118	4.3	J		
1,2-Dichloropropane	172GP00118	0.99	J	0.16	5
Benzene	E172GP00218	0.3	J	0.32	5
cis-1,2-DCE	E172GP00118	4.3	J	6.1	70
	E172GP00218	4.2	J		
Chlorobenzene	E172GW001	12.7	=	11	100
	E172GP0218	21.9	=		
Methyl ethyl ketone	E172GP00218	1.8	J	190	NA
Toluene	E172GP0118	0.3	J	75	1,000
	E172GP0218	0.23	J		
	E172GP0318	0.18	J		
TCE	E172GP0118	1.3	J	1.6	5
Vinyl Chloride	E172GW001	2.3	J	0.019	2
	E172GP0218	4.4	J		

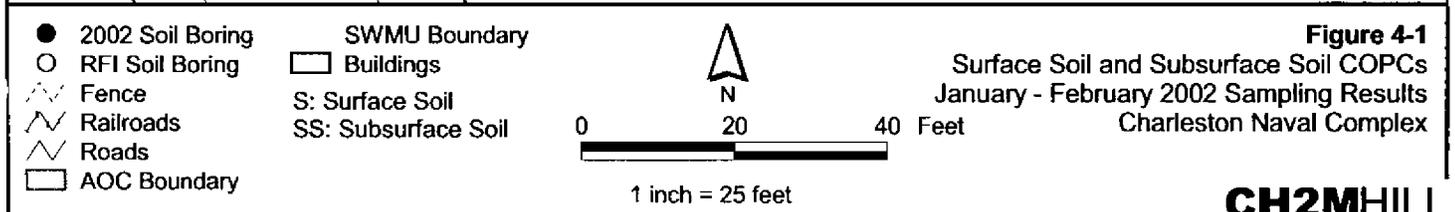
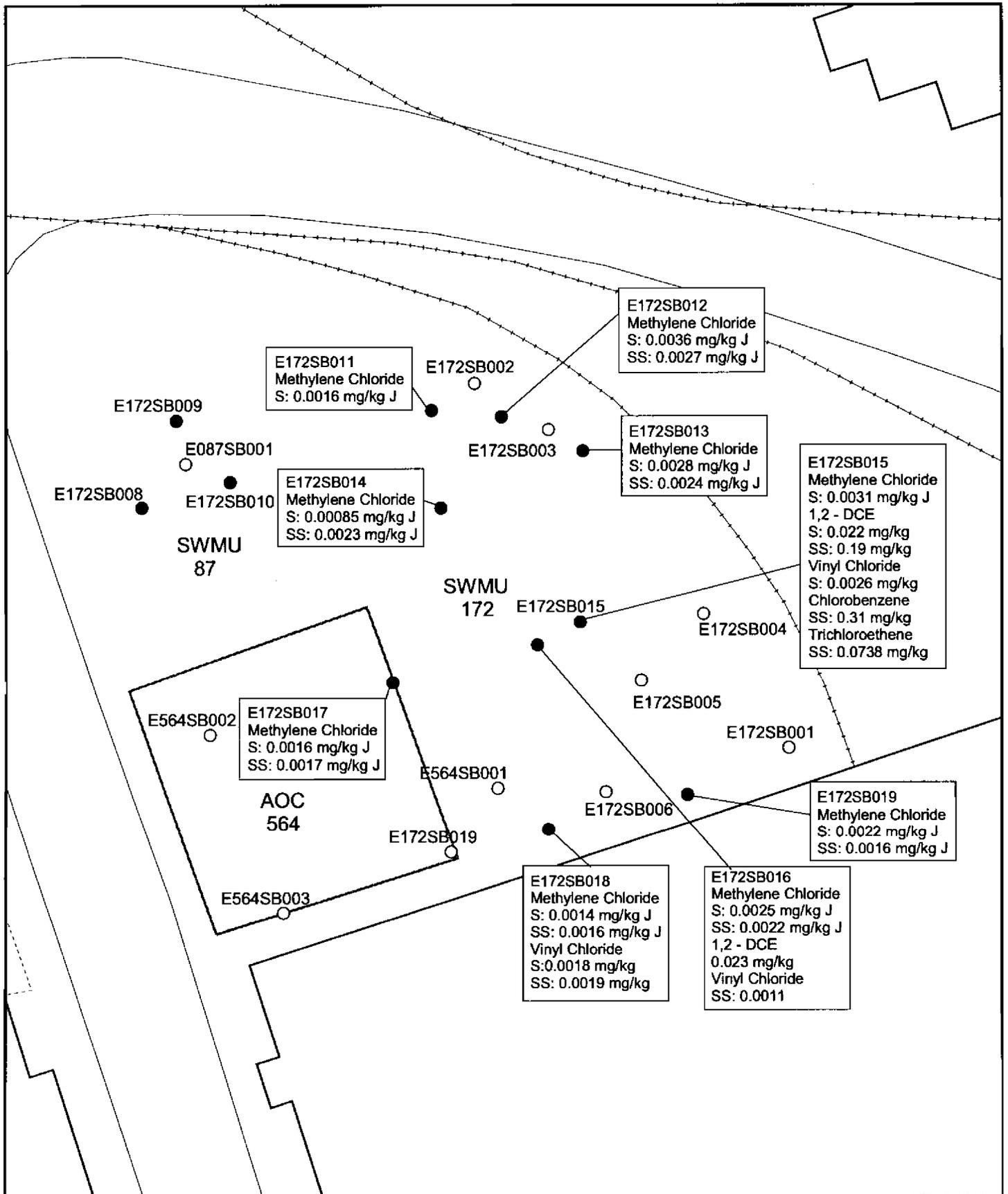
= Indicates that the analyte was detected at the concentration shown.

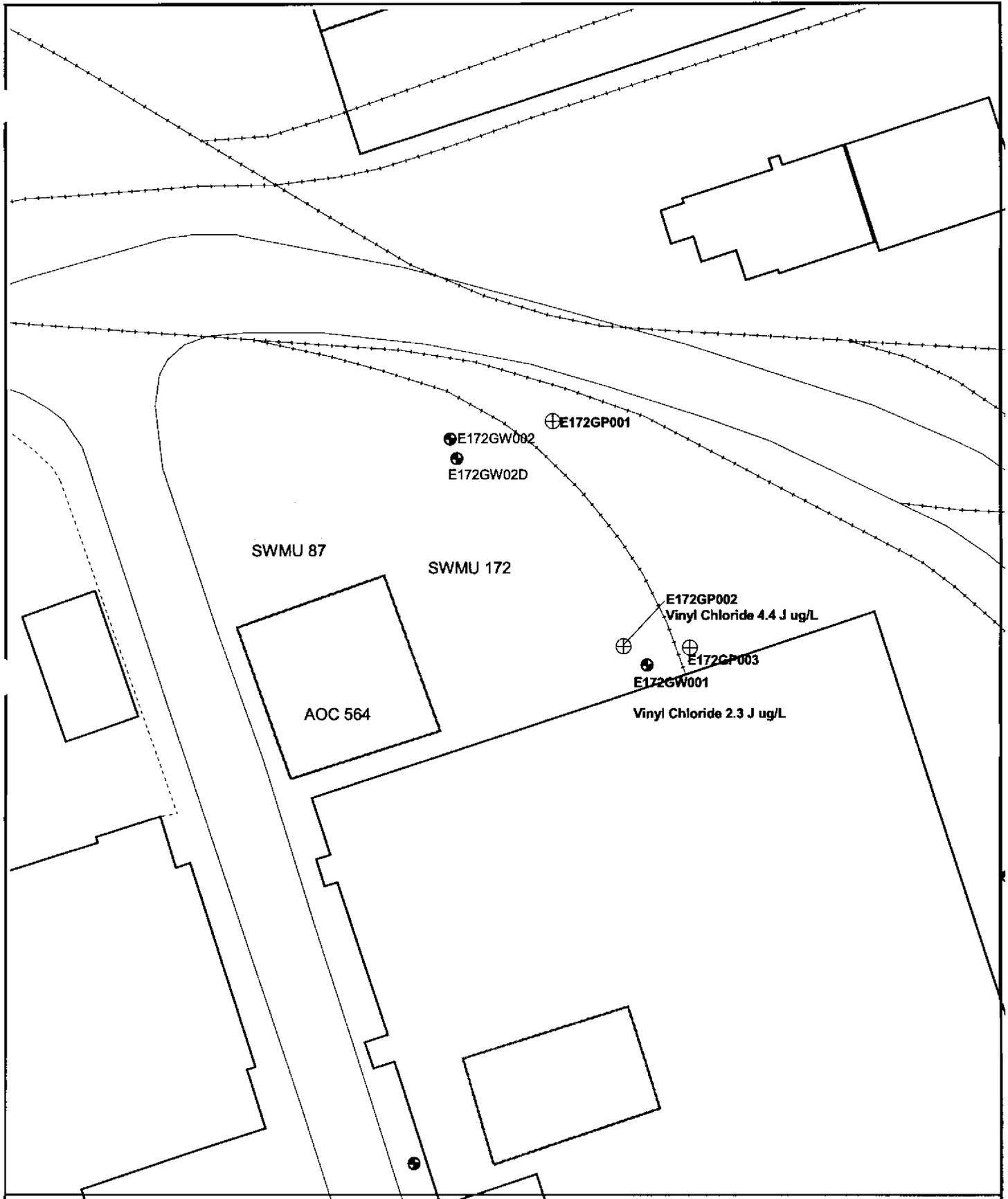
J Indicates an estimated value. One or more quality control (QC) parameters were outside control limits or the value was detected below the laboratory's quantification limit.

U Indicates that the concentration was not detected.

UJ Indicates that the concentration was not detected and is estimated.

NA Not Applicable





- Groundwater Well
- ⊕ Groundwater Probe Sample Location
- Fence
- Railroads
- Roads - Lines
- AOC Boundary
- SWMU Boundary
- Buildings

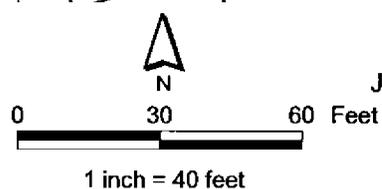


Figure 4-2
Groundwater COPCs
January - February 2002 Sampling Results
Charleston Naval Complex

1 **5.0 COPC/COC Refinement**

2 The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified arsenic, BEQs, and dieldrin as
3 surface soil COCs for the unrestricted (i.e., residential) land use scenario, and arsenic as a
4 surface soil COC for the industrial land use scenario. Chlorobenzene, 1,4-DCB, and 1,2-DCE
5 (total) were identified in the RFI report as shallow groundwater COCs, and arsenic and
6 manganese as deep groundwater COCs for Combined SWMU 87.

7 Additional soil and groundwater sampling conducted by CH2M-Jones during 2002, as
8 described Section 4.0, identified the following additional COPCs - 1,2-DCE, methylene
9 chloride, and vinyl chloride in surface soil, chlorobenzene, 1,2-DCE, methylene chloride,
10 and TCE in subsurface soil, and vinyl chloride in shallow groundwater.

11 In addition to the original screening criteria, current screening criteria for Zone E includes
12 comparing VOC concentrations in soil to SSLs with a DAF of 1. The results of this screening
13 are also discussed as part of the following section.

14 **5.1 Rescreening of VOCs in Soil Using SSL (DAF = 1)**

15 **5.1.1 1,2-DCE (Total)**

16 1,2-DCE was not identified as a COC in the RFI, but it exceeded the SSL (DAF=1) of 0.02
17 mg/kg for cis-1,2-DCE at four surface soil and two subsurface soil sample locations from
18 the RFI and January 2002 sampling events. 1,2-DCE detections in surface soil samples
19 exceeding the SSL (DAF=1) were found at E172SB005 (at 0.058 mg/kg), E172SB006 (at 0.031
20 mg/kg), at E172SB015 (at 0.022 mg/kg), and at E172SB016 (at 0.023 mg/kg). In subsurface
21 soil samples, 1,2-DCE detections exceeded the SSL (DAF=1) at two locations E172SB005 (at
22 0.10 mg/kg) and E172SB015 (at 0.19 mg/kg). Table 5-1 shows soil detections of 1,2-DCE at
23 the site.

24 A site-specific SSL has been calculated for 1,2-DCE for the paved and unpaved scenarios.
25 The SSL calculations are included in Appendix D. The site-specific SSL for the unpaved
26 scenario is 0.32 mg/kg, and the SSL for the paved scenario is 2.07 mg/kg. The average
27 surface soil 1,2-DCE concentration at this site was calculated to be 0.0104 mg/kg as shown
28 in Table 5-1. This value is below the site-specific SSLs for both the unpaved and paved
29 scenarios, indicating that surface soil detections of 1,2-DCE are not a leaching concern at
30 this site.

1 The average subsurface 1,2-DCE concentration at this site is 0.0194 mg/kg, which is also
2 below the site-specific SSL for both the unpaved and paved scenarios, indicating that
3 subsurface soil detections of 1,2-DCE are not a leaching concern at this site.

4 1,2-DCE detections in the groundwater samples at the site have been below the EPA Region
5 III tap water RBC and MCL, indicating that there is no significant leaching of 1,2-DCE into
6 groundwater. Based on these observations, 1,2-DCE is not considered a COC for soils at
7 Combined SWMU 87.

8 **5.1.2 Chlorobenzene**

9 The *Zone E RFI Report, Revision 0* did not identify chlorobenzene as a soil COC. One
10 chlorobenzene detection of 0.13 mg/kg in the surface soil sample from RFI boring location
11 E172SB006 and one detection in the subsurface soil sample from boring location E172SB015
12 at 0.31 mg/kg exceeded the SSL (DAF=1) of 0.07 mg/kg. Additional soil samples were
13 collected during February 2002 to delineate this exceedance. Table 5-1 shows soil detections
14 of chlorobenzene at the site.

15 A site-specific SSL was calculated for chlorobenzene for both the paved and unpaved
16 scenarios. The SSL for the unpaved scenario is 2.53 mg/kg, and for the paved scenario the
17 SSL is 16.4 mg/kg. The SSL calculations are included in Appendix F. The chlorobenzene
18 detections at this paved site are below these SSL values, indicating that these detections do
19 not pose a leaching concern at this site. Based on this information, chlorobenzene is not
20 considered a soil COC at this site.

21 **5.1.3 Chloromethane**

22 Chloromethane was not identified as a COC in the RFI, but it exceeded the risk-based SSL
23 (DAF=1) from the EPA Region III RBC Table of 0.00054 mg/kg in two subsurface soil
24 samples from E564SB001 (at 0.007 mg/kg) and E172SB006 (at 0.003 mg/kg).

25 During the January 2002 sampling, soil borings E572SB016 through E572SB019 were
26 advanced to delineate the chloromethane exceedances. Chloromethane was not detected
27 above its laboratory detection limit in these surface and subsurface soil samples. Table 5-1
28 shows soil detections of chloromethane at the site.

29 Site-specific SSLs have been calculated for chloromethane for the unpaved and paved
30 scenarios. The SSL for chloromethane under the unpaved scenario is 0.0047 mg/kg, and the
31 SSL for the paved scenario is 0.031 mg/kg. These SSL calculations are included in Appendix
32 F.

1 Chloromethane was not detected in any of the 19 surface soil samples analyzed for this
2 chemical. It was detected in only two of the 19 subsurface soil samples analyzed for it. The
3 average concentration of these two detects (0.003J and 0.007J mg/kg) is 0.005 mg/kg, which
4 is approximately equal to the unpaved site-specific SSL (0.0047 mg/kg), and well below the
5 paved site specific SSL (0.031 mg/kg). Additionally, chloromethane was not detected above
6 laboratory detection limits in any shallow or deep groundwater samples from the RFI or
7 2002 sampling events conducted at the site. Based on these observations, chloromethane is
8 not considered a COC at this site.

9 **5.1.4 Methylene Chloride**

10 Methylene chloride was not identified as a COC during the RFI. Table 5-1 shows methylene
11 chloride detections in soil at the site. During the 2002 sampling for VOCs, methylene
12 chloride was detected above its SSL of 0.001 mg/kg in all surface soil samples, with
13 detections ranging from 0.0014 mg/kg to 0.0022 mg/kg. It was also detected in seven
14 subsurface soil samples with detections ranging from 0.0016 mg/kg to 0.0027 mg/kg.

15 Site-specific SSLs were calculated for methylene chloride for the unpaved and paved
16 scenarios. The SSLs are 0.003 mg/kg for the unpaved scenario and 0.02 mg/kg for the
17 paved scenario. The SSL calculations are included in Appendix F.

18 The methylene chloride detections at this paved site are all below both the paved and
19 unpaved site-specific SSLs, indicating that these detections do not pose a leaching concern
20 at the site.

21 Methylene chloride has not been detected above laboratory detection limits in groundwater
22 samples collected during the 2002 sampling or during historic RFI sampling events at the
23 site. This indicates that methylene chloride is not a threat to groundwater quality. Based on
24 these observations, methylene chloride is not considered a COC at this site.

25 **5.1.5 PCE**

26 PCE was not identified as a COC in the RFI, but one detection of 0.52 mg/kg in the surface
27 soil sample in E572SB005 exceeded its SSL (DAF=1) of 0.003 mg/kg, which is based on
28 current screening criteria. During the January 2002 sampling event, soil borings E572SB015,
29 E572SB016, and E572SB019 were advanced to delineate the PCE exceedance at RFI boring
30 location E572SB005. PCE was not detected above its laboratory detection limit in subsurface
31 soil samples from these boring locations. The only PCE detection in surface soil samples
32 collected during the January 2002 sampling event was from E572SB018 at 0.0021 mg/kg,
33 below its SSL.

1 Site-specific SSLs calculated for PCE for the unpaved and paved scenarios are 0.15 mg/kg
2 and 0.97 mg/kg, respectively. The SSL calculations are included in Appendix F. PCE
3 detections in surface and subsurface soil at this paved site are below both the site-specific
4 paved and unpaved SSLs, indicating that these detections are not a leaching concern.

5 Additionally, PCE was detected in only one groundwater sample from E172GW001 during
6 the fourth RFI sampling event, at 2 µg/L (below the MCL of 5 µg/L). There were no other
7 detections of PCE in this well from previous sampling events, and no detections in any
8 other wells from any of the sampling events from the RFI or January 2002 sampling. There
9 appears to be no evidence of a significant presence of PCE at the site based on its sporadic
10 occurrence in soil as discussed above. Therefore, PCE is not considered a soil COC at
11 Combined SWMU 87.

12 **5.1.6 TCE**

13 TCE was not considered a COC during the RFI, but one subsurface soil detection of 0.0738
14 mg/kg at E172SB015 (from the January 2002 sampling event) exceeded the generic SSL
15 (with a DAF=1) for TCE of 0.003 mg/kg. There were no other detections of TCE above its
16 generic SSL (DAF=1) in surface or subsurface soil samples at the site.

17 Site-specific SSLs were calculated for TCE for the unpaved and paved scenarios and are
18 0.055 mg/kg and 0.36 mg/kg, respectively. The SSL calculations are included in Appendix
19 F. The average subsurface TCE concentration for the site was calculated to be 0.0066 mg/kg,
20 which is below both the site-specific paved and unpaved SSLs, indicating that TCE in soil at
21 this site is not a leaching concern. Based on these observations, TCE is not considered a
22 COC in soils at this site.

23 **5.1.7 Vinyl Chloride**

24 Vinyl chloride was not considered a COC during the RFI, but two surface soil samples
25 showed detections of vinyl chloride above its generic SSL (DAF=1) of 0.0007 mg/kg
26 (E172SB015 at 0.0026 mg/kg and E172SB018 at 0.0018 mg/kg). Also, two subsurface soil
27 samples showed detections of vinyl chloride above its generic SSL (DAF=1) of 0.0007
28 mg/kg (E172SB016 at 0.0011 mg/kg and E172SB018 at 0.0019 mg/kg).

29 Site-specific SSLs were calculated for vinyl chloride for both the unpaved and paved
30 scenarios as 0.006 mg/kg and 0.04 mg/kg, respectively. The SSL calculations are included
31 in Appendix F.

32 The individual vinyl chloride detections at E172SB015 and E172SB018 are below both the
33 site-specific unpaved and paved SSLs, indicating that vinyl chloride is not a leaching

1 concern. Similarly, the individual vinyl chloride detections at E172SB016 and E172SB018 are
2 below both the site-specific unpaved and paved SSLs, indicating the vinyl chloride is not a
3 leaching concern. For this reason, vinyl chloride is not considered a COC in soil at
4 Combined SWMU 87.

5 **5.2 Soil COCs**

6 **5.2.1 Arsenic**

7 Arsenic was identified as a COC in the *Zone E RFI Report, Revision 0* based on a detection of
8 66.5 mg/kg in the surface soil sample from the RFI boring location E087SB001, which
9 exceeded the Zone E BRC of 23.9 mg/kg. During the January 2002 soil sampling event,
10 surface and subsurface soil samples were collected at borings E572SB008 through
11 E572SB010 to further delineate the nature and extent of arsenic. Table 5-1 shows detections
12 of arsenic from the RFI and January 2002 sampling events. Arsenic was detected in all three
13 surface soil samples exceeding its residential and industrial RBCs, but did not exceed the
14 Zone E maximum background concentration for arsenic of 68 mg/kg. Arsenic was detected
15 in the subsurface soil samples, but the concentrations did not exceed the SSL of 14.5 mg/kg.

16 A 95-percent Upper Confidence Limit (UCL_{95}) exposure concentration estimate was
17 calculated from surface soil arsenic concentrations at the site to be 22.8 mg/kg. Table 5-3
18 shows the UCL_{95} calculations.

19 For sites where background arsenic levels exceed RBCs, EPA Region IV typically considers
20 arsenic concentrations in surface soil of up to 20 mg/kg and 270 mg/kg as acceptable for
21 unrestricted and industrial land uses, respectively (EPA, 2001). Based on these criteria and
22 the UCL_{95} exposure concentration estimate of 22.8 mg/kg, arsenic would be considered a
23 COC for unrestricted land use but not industrial land use.

24 **5.2.2 BEQs**

25 The RFI report identified BEQs in surface soil as COCs based on exceedances of the
26 residential RBC of 0.088 mg/kg for benzo[a]pyrene. None of the BEQ detections in surface
27 and subsurface soils exceed the respective CNC sitewide reference concentrations of 1.304
28 mg/kg for surface soil and 1.4 mg/kg for subsurface soil. Table 5-1 shows detected BEQ
29 concentrations in soils at this site. Based on this observation, BEQs are not considered a
30 COC at this site.

1 **5.2.3 Dieldrin**

2 Dieldrin was identified as a surface soil COC in the RFI report, based on an exceedance of
3 its SSL. One surface soil detection of 0.29 mg/kg at E087SB001 exceeded its SSL (DAF=10) of
4 0.002 mg/kg. During the January 2002 soil sampling event, soil borings E572SB008 through
5 E572SB010 were advanced to delineate this dieldrin exceedance. The single detection at
6 E572SB001 could be a result of the impact of potential past application of pesticides along
7 historic railroad lines, which are shown to run through this location in Figure G-1 (included
8 in Appendix G). Railroad lines currently exist approximately 40 ft north of soil boring
9 location E087SB001. Dieldrin was not detected above its laboratory detection limit in the
10 subsurface soil at this location, indicating that this detection is not a leaching concern.

11 The average dieldrin concentration in surface soil is 0.0242 mg/kg, as indicated in Table 5-1.
12 Site-specific SSLs were calculated for dieldrin and are 0.08 mg/kg and 0.012 mg/kg for the
13 paved and unpaved scenarios, respectively. The SSL calculations are included in Appendix
14 F.

15 The average surface soil dieldrin concentration is above the site-specific SSL for the
16 unpaved scenario, but below the site-specific SSL for the paved scenario. The site is
17 expected to remain paved in the future, and the single detection of dieldrin in surface soils
18 at this site does not exceed the paved SSL, indicating that this detection does not pose a
19 leaching concern under current site conditions.

20 Dieldrin was also not detected in any of the other surface or subsurface soil samples at the
21 site. Additionally, dieldrin was not detected above laboratory detection limits in the
22 groundwater indicating that the detections in soil do not pose a threat to groundwater at
23 the site, under current site conditions.

24 Should future land use change and the pavement at the site be removed, the single
25 detection of dieldrin above the site-specific SSL could potentially be of significance to
26 leaching concerns. Therefore, dieldrin will be retained as a soil COC for the unrestricted
27 land use scenario but not for the industrial land use scenario.

28 **5.2.4 Summary of COCs in Soil**

29 Based on the results of soil sampling from the RFI and additional investigations conducted
30 during January 2002, as well as the discussions presented above, arsenic and dieldrin in soil
31 have been identified as surface soil COCs for the unrestricted land use scenario, but not for
32 the industrial land use scenario.

1 **5.3 Groundwater COCs**

2 **5.3.1 Shallow Groundwater COCs**

3 **1,2-DCE**

4 1,2-DCE was identified as a COC in the *Zone E RFI Report, Revision 0* for shallow
5 groundwater based on a single exceedance of the MCL of 70 µg/L in E172GW001 during
6 the fourth RFI sampling event. 1,2-DCE did not exceed the MCL in the three previous RFI
7 sampling events and one RFI sampling event after the MCL exceedance in this well. Table
8 5-2 shows 1,2-DCE detections in shallow groundwater samples from site wells. In addition,
9 1,2-DCE was not detected above the MCL during the January 2002 investigation. Generally,
10 based on these observations, a chemical would not be considered a COC in shallow
11 groundwater. However, because DCE can biologically degrade to vinyl chloride, which has
12 a much lower MCL than DCE, it is retained as a shallow groundwater COC.

13 **1,4-DCB**

14 1,4-DCB was identified as a COC for shallow groundwater in the RFI, based on one
15 detection of 6.0 µg/L in well E172GW001 above the EPA Region III tap water RBC of 4.8
16 µg/L, however this detection was below the MCL of 75 µg/L. Table 5-2 shows 1,4-DCB
17 detections in shallow groundwater samples from site wells. There were no other
18 exceedances of the MCL of 75 µg/L during any of the RFI sampling events at E172GW001.
19 Therefore, 1,4-DCB is not considered a COC.

20 **Chlorobenzene**

21 Chlorobenzene was identified as a COC for shallow groundwater. Table 5-2 shows
22 chlorobenzene detections in shallow groundwater samples from site wells. Low levels of
23 chlorobenzene were detected in well E172GW001 above its MCL of 100 µg/L during all four
24 of the RFI sampling events, with detections ranging from 110 µg/L to 330 µg/L. During the
25 February sampling event, this well was resampled and three DPT samples were collected
26 downgradient of this well. Chlorobenzene was not detected above its MCL in any of the
27 samples. The previous sampling event at well E172GW001 was the fourth RFI sampling
28 event conducted during March 1998, which showed a detection of 120 µg/L. The February
29 2002 resampling of this well did not show detections above laboratory detection limits,
30 indicating the absence of chlorobenzene in groundwater at this location.

31 None of the groundwater samples collected in the DPT locations downgradient of this well
32 during February 2002 showed chlorobenzene detections above laboratory detection limits,
33 indicating that the historic chlorobenzene detections in well E172GW001 may have been a

1 localized occurrence of chlorobenzene, and that in the four years between the last RFI
2 sampling event (March 1998) and the February 2002 sampling event, natural attenuation of
3 chlorobenzene could be occurring at this location. However, chlorobenzene will be retained
4 as a COC in shallow groundwater at this site.

5 **PCE**

6 PCE was not identified as a COC in the RFI report for groundwater. There was only one
7 detection of PCE above laboratory detection limits, from among all groundwater samples
8 collected during four RFI sampling events at the site. This detection of 2 µg/L from the
9 fourth sampling event in well E172GW001 is below the MCL for PCE of 5 µg/L. PCE was
10 detected above its MCL in DPT groundwater samples collected as part of the Zone L
11 sanitary and storm sewer investigations, as discussed in Section 6.0 of this report. Based on
12 these detections, PCE is considered a COC in shallow groundwater at this site.

13 **TCE**

14 TCE was not identified as a COC in the RFI report for shallow groundwater. Table 5-2
15 shows TCE detections in shallow groundwater samples from site wells. However, during
16 the rescreening of the RFI data by CH2M-Jones, one detection of TCE at 6 µg/L, in well
17 E172GW001 during the third sampling event of the RFI (January 1997), was noted as
18 exceeding its MCL of 5 µg/L. TCE did not exceed its MCL in any of the preceding or
19 succeeding RFI sampling events or during the February 2002 sampling in this well. TCE has
20 not been identified as a COC in surface or subsurface soils at this site, and the low levels of
21 TCE detected in groundwater do not indicate a significant release of TCE at the site.
22 Additionally, TCE was detected in several groundwater samples above its MCL, as
23 discussed in Section 6.0, in several DPT borings installed to collect groundwater samples as
24 part of the Zone L sanitary and storm sewer investigations. Based on these observations,
25 TCE is considered a COC in shallow groundwater at this site.

26 **Vinyl Chloride**

27 Vinyl chloride was not identified as a COC in the RFI report shallow groundwater. Table 5-
28 2 shows vinyl chloride detections in shallow groundwater samples from site wells. Vinyl
29 chloride detections exceeded its MCL of 2 µg/L during all but one of the RFI sampling
30 events, ranging from 14 µg/L to 140 µg/L. During the February 2002 sampling event, vinyl
31 chloride was detected in E172GW001 at 2.3 ug/L and in the DPT sample from E172GP002 at
32 4.4 µg/L. Both detections exceeded the MCL of 2 µg/L. Vinyl chloride is being considered a
33 shallow groundwater COC at this site.

5.3.2 Deep Groundwater COCs

Arsenic

Arsenic was identified as a COC in the *Zone E RFI Report, Revision 0* based on a single detection. Arsenic exceeded its EPA Region III tap water RBC of 0.045 µg/L in E172GW02D, with detections ranging from 18.5 µg/L to 33 µg/L in four sampling events. None of the detections exceeded the State of South Carolina MCL for arsenic of 50 µg/L. Based on this observation, arsenic is not considered a COC at the site. Table 5-2 shows arsenic detections in deep groundwater at the site.

Manganese

The RFI report identified manganese as a deep groundwater COC based on a detection of 1,240 µg/L in well E172GW02D during the first sampling event. This detection exceeds the maximum Zone E deep groundwater background manganese concentration of 865 µg/L. No primary MCL has been established for manganese. Table 5-2 shows the manganese detections in this well during the four RFI sampling events.

The RFI report compared the manganese detections with a tap water RBC value of 84 µg/L. However, the tap water RBC value published in the EPA Region III RBC Table (EPA, 2000) is 5,100 µg/L. The manganese detections in deep groundwater at the site do not exceed this tap water RBC. Therefore, manganese in deep groundwater is not considered a COC at this site.

5.4 COC Summary

Based on the discussions above, arsenic and dieldrin in surface soils have been retained as COCs for the unrestricted land use scenario. 1,2-DCE has been retained as a shallow groundwater COC due to the potential for its biodegradation into vinyl chloride, which has a lower MCL than 1,2-DCE. Low-level concentrations of chlorobenzene and vinyl chloride have been detected in shallow groundwater, above their respective MCLs, therefore they have also been retained as shallow groundwater COCs. Low-level detections of PCE and TCE slightly above their respective MCLs also occurred in several DPT groundwater samples that were collected at this site as part of the Zone L sanitary and storm sewer investigations; therefore PCE and TCE are identified as COCs.

A CMS Work Plan is included in Section 8.0 of this document to present the steps for a focused CMS for soil and groundwater at the Combined SWMU 87 site.

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
Arsenic	Surface Soil			0.43	3.8	14.5	0.95 - 68
	E087SB001	66.5	=				
	E172SB001	16.5	=				
	E172SB002	12.5	=				
	E172SB003	8.2	=				
	E172SB004	6.1	=				
	E172SB005	4.8	=				
	E172SB006	22.6	=				
	E564SB001	4.3	=				
	E564SB002	3.3	=				
	E564SB003	3.6	=				
	E172SB008	3.59	=				
	E172SB009	3.91	=				
E172SB010	10.4	=					
Arsenic	Subsurface Soil			0.43	3.8	14.5	0.83 - 26
	E087SB001	6.6	=				
	E172SB001	2.2	=				
	E172SB002	5.2	=				
	E172SB003	5.0	=				
	E172SB004	7.5	=				
	E172SB005	5.3	=				
	E172SB006	1.6	=				
	E564SB001	4.2	=				
	E564SB002	1.7	=				
	E564SB003	2.2	=				
	E172SB008	7.95	=				
	E172SB009	4.58	=				
E172SB010	2.96	=					

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
BEQs	Surface Soil			0.88	0.74	NA	1.304
	E087SB001	0.439	=				
	E172SB001	0.385	=				
	E172SB002	0.485	=				
	E172SB003	0.299	=				
	E172SB004	0.299	=				
	E172SB005	0.485	=				
	E172SB006	0.450	=				
	E564SB001	0.508	=				
	E564SB002	0.296	=				
E564SB003	0.186	=					
BEQs	Subsurface Soil			NA	NA	NA	1.4
	E087SB001	0.325	=				
	E172SB001	0.496	=				
	E172SB002	0.497	=				
	E172SB003	0.555	=				
	E172SB004	0.555	=				
	E172SB005	0.451	=				
	E172SB006	0.439	=				
	E564SB001	0.451	=				
	E564SB002	0.439	=				
E564SB003	0.435	=					
Chlorobenzene	Surface Soil			160	4,100	0.07	NA
	E087SB001	0.006	U				
	E172SB001	0.007	UJ				
	E172SB002	0.006	U				
	E172SB003	0.006	UJ				
	E172SB004	0.006	U				
	E172SB005	0.032	U				

TABLE 5-1
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 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
Chlorobenzene	Surface Soil			160	4,100	0.07	NA
	E172SB006	0.13	J				
	E564SB002	0.006	U				
	E564SB003	0.005	U				
	E172SB011	0.0078	U				
	E172SB012	0.0072	U				
	E172SB013	0.0068	U				
	E172SB014	0.0068	U				
	E172SB015	0.0013	J				
	E172SB016	0.0056	U				
	E172SB017	0.0046	U				
	E172SB018	0.0043	U				
	E172SB019	0.0053	U				
Chlorobenzene	Subsurface Soil					0.07	NA
	E087SB001	0.006	U				
	E172SB001	0.006	U				
	E172SB002	0.006	U				
	E172SB003	0.007	UJ				
	E172SB004	0.007	U				
	E172SB005	0.2	=				
	E172SB006	0.006	U				
	E564SB001	0.006	U				
	E564SB002	0.006	U				
	E564SB003	0.006	U				
	E172SB011	0.0056	U				
	E172SB012	0.0063	U				
	E172SB013	0.0063	U				
	E172SB014	0.0052	U				
E172SB015	0.31	J					

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
Chlorobenzene	Subsurface Soil					0.07	NA
	E172SB016	0.0037	J				
	E172SB017	0.0041	U				
	E172SB018	0.0043	U				
Chloromethane	Surface Soil			49	440	0.000516	NA
	E172SB019	0.0045	U				
	E087SB001	0.012	U				
	E172SB001	0.014	U				
	E172SB002	0.013	U				
	E172SB003	0.012	U				
	E172SB004	0.012	U				
	E172SB005	0.064	U				
	E172SB006	0.018	U				
	E564SB001	0.013	U				
	E564SB002	0.011	U				
	E564SB003	0.011	U				
	E172SB011	0.0156	U				
	E172SB012	0.0144	U				
	E172SB013	0.0136	U				
	E172SB014	0.0137	U				
	E172SB015	0.0091	U				
	E172SB016	0.0111	U				
	E172SB017	0.0092	U				
	E172SB018	0.0086	U				
E172SB019	0.0106	U					
Chloromethane	Subsurface Soil					0.000516	NA
	E087SB001	0.013	U				
	E172SB001	0.012	U				
	E172SB002	0.013	U				

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations	
Chloromethane	Subsurface Soil					0.000516	NA	
	E172SB003	0.014	U					
	E172SB004	0.014	U					
	E172SB005	0.012	U					
	E172SB006	0.003	J					
	E564SB001	0.007	J					
	E564SB002	0.011	U					
	E564SB003	0.012	U					
	E172SB011	0.0111	U					
	E172SB012	0.0126	U					
	E172SB013	0.0126	U					
	E172SB014	0.0104	U					
	E172SB015	0.9430	U					
	E172SB016	0.0091	U					
	E172SB017	0.0082	U					
	E172SB018	0.0086	U					
	E172SB019	0.0089	U					
	1,2-DCE (Total)	Surface Soil			70	1,840	0.02	NA
		E087SB001	0.006	U				
E172SB001		0.007	U					
E172SB002		0.006	U					
E172SB003		0.006	U					
E172SB004		0.006	U					
E172SB005		0.058	=					
E172SB006		0.031	J					
E564SB002		0.006	U					
E564SB003		0.005	U					
E172SB011		0.0078	U					
E172SB001		0.0072	U					

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
1,2-DCE (Total)	Surface Soil			70	1,840	0.02	NA
	E172SB013	0.0068	U				
	E172SB014	0.0068	U				
	E172SB015	0.022	=				
	E172SB016	0.023	=				
	E172SB017	0.0046	U				
	E172SB018	0.0053	=				
	E172SB019	0.0005	J				
1,2-DCE (Total) Average Surface Soil Concentration		0.0104					
1,2-DCE (Total)	Subsurface Soil					0.02	NA
	E087SB001	0.006	U				
	E172SB001	0.006	U				
	E172SB002	0.006	U				
	E172SB003	0.007	U				
	E172SB004	0.007	U				
	E172SB005	0.1	=				
	E172SB006	0.006	U				
	E564SB001	0.006	U				
	E564SB002	0.006	U				
	E564SB003	0.006	U				
	E172SB011	0.0056	U				
	E172SB012	0.0063	U				
	E172SB013	0.0063	U				
	E172SB014	0.0052	U				
	E172SB015	0.19	J				
	E172SB016	0.017	=				
	E172SB017	0.0041	U				
	E172SB018	0.001	J				

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
1,2-DCE (Total)	Subsurface Soil					0.02	NA
	E172SB019	0.0045	U				
	1,2-DCE (Total) Average Subsurface Soil Concentration	0.0194					
Dieldrin	Surface Soil			0.04	0.36	0.002	NA
	E087SB001	0.29	J				
	E172SB001	0.0035	U				
	E172SB002	0.0032	U				
	E172SB003	0.0031	U				
	E172SB004	0.0031	U				
	E172SB005	0.0032	U				
	E172SB006	0.0045	U				
	E564SB001	0.0033	U				
	E564SB002	0.0028	U				
	E564SB003	0.0027	U				
	E172SB008	0.0029	U				
	E172SB009	0.003	U				
	E172SB010	0.0142	U				
	Dieldrin Average Surface Soil Concentration	0.0242					
Dieldrin	Subsurface Soil					0.002	NA
	E087SB001	0.0032	U				
	E172SB001	0.003	U				
	E172SB002	0.0033	U				
	E172SB003	0.0036	U				
	E172SB004	0.0036	U				
	E172SB005	0.003	U				
	E172SB006	0.0029	U				
	E564SB001	0.0029	U				

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
Dieldrin	Subsurface Soil					0.002	NA
	E564SB002	0.0029	U				
	E564SB003	0.003	U				
	E172SB008	0.0031	UJ				
	E172SB009	0.003	U				
	E172SB010	0.0608	U				
Methylene Chloride	Surface Soil			85	760	0.001	NA
	E087SB001	0.006	U				
	E172SB001	0.008	J				
	E172SB002	0.006	J				
	E172SB003	0.006	J				
	E172SB004	0.006	U				
	E172SB005	0.032	U				
	E172SB006	0.009	U				
	E172SB011	0.002	J				
	E172SB012	0.004	J				
	E172SB013	0.003	J				
	E172SB014	0.001	J				
	E172SB015	0.003	J				
	E172SB016	0.003	J				
	E172SB017	0.002	J				
	E172SB018	0.001	J				
	E172SB019	0.002	J				
	E564SB001	0.005	J				
	E564SB002	0.006	U				
	E564SB003	0.002	J				
Methylene Chloride	Subsurface Soil					0.001	NA
	E087SB001	0.006	U				
	E172SB001	0.006	U				

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations	
Methylene Chloride	Subsurface Soil					0.001	NA	
	E172SB002	0.006	U					
	E172SB003	0.007	U					
	E172SB004	0.007	U					
	E172SB005	0.006	U					
	E172SB006	0.039	U					
	E172SB011	0.0056	U					
	E172SB012	0.0027	J					
	E172SB013	0.0024	J					
	E172SB014	0.0023	J					
	E172SB015	0.472	U					
	E172SB016	0.0022	J					
	E172SB017	0.0017	J					
	E172SB018	0.0016	J					
	E172SB019	0.0016	J					
	E564SB001	0.032	U					
	E564SB002	0.006	U					
	E564SB003	0.006	U					
	PCE	Surface Soil			12	110	0.003	NA
		E087SB001	0.006	U				
E172SB001		0.007	UJ					
E172SB002		0.006	U					
E172SB003		0.006	UJ					
E172SB004		0.006	U					
E172SB005		0.52	=					
E172SB006		0.009	UJ					
E564SB002		0.006	U					
E564SB003		0.005	U					
E172SB011		0.0078	U					

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
PCE	Surface Soil			12	110	0.003	NA
	E172SB012	0.0072	U				
	E172SB013	0.0068	U				
	E172SB014	0.0068	U				
	E172SB015	0.0045	U				
	E172SB016	0.0056	U				
	E172SB017	0.0046	U				
	E172SB018	0.0021	J				
	E172SB019	0.0053	U				
PCE	Subsurface Soil					0.003	NA
	E087SB001	0.006	U				
	E172SB001	0.006	U				
	E172SB002	0.006	U				
	E172SB003	0.007	UJ				
	E172SB004	0.007	U				
	E172SB005	0.006	U				
	E172SB006	0.006	U				
	E564SB001	0.006	U				
	E564SB002	0.006	U				
	E564SB003	0.006	U				
	E172SB011	0.0056	U				
	E172SB012	0.0063	U				
	E172SB013	0.0063	U				
	E172SB014	0.0004	J				
	E172SB015	0.472	U				
	E172SB016	0.0045	U				
	E172SB017	0.0041	U				
	E172SB018	0.0043	U				
E172SB019	0.0045	U					

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
TCE	Surface Soil			58	520	0.003	NA
	E087SB001	0.006	U				
	E172SB001	0.007	UJ				
	E172SB003	0.006	UJ				
	E172SB004	0.006	U				
	E172SB005	0.032	U				
	E172SB006	0.009	UJ				
	E564SB001	0.007	UJ				
	E564SB002	0.006	U				
	E564SB003	0.005	U				
	E172SB002	0.006	U				
	E172SB011	0.008	U				
	E172SB012	0.007	U				
	E172SB013	0.007	U				
	E172SB014	0.007	U				
	E172SB015	0.005	U				
	E172SB016	0.001	J				
	E172SB017	0.005	U				
	E172SB018	0.0000	J				
	E172SB019	0.005	U				
TCE	Subsurface Soil					0.003	NA
	E087SB001	0.006	U				
	E172SB001	0.006	U				
	E172SB003	0.007	UJ				
	E172SB004	0.007	U				
	E172SB005	0.006	U				
	E172SB006	0.006	U				
	E564SB001	0.006	U				
	E564SB002	0.006	U				

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
TCE	Subsurface Soil					0.003	NA
	E564SB003	0.006	U				
	E172SB002	0.006	U				
	E172SB011	0.0056	U				
	E172SB012	0.0063	U				
	E172SB013	0.0063	U				
	E172SB014	0.0052	U				
	E172SB015	0.0738	J				
	E172SB016	0.0045	U				
	E172SB017	0.0041	U				
	E172SB018	0.0043	U				
	E172SB019	0.0045	U				
TCE Average Subsurface Soil Concentration		0.0066					
Vinyl Chloride	Surface Soil			0.43	3.8	0.0007	NA
	E087SB001	0.012	U				
	E172SB001	0.014	U				
	E172SB003	0.012	U				
	E172SB004	0.012	U				
	E172SB005	0.064	U				
	E172SB006	0.018	U				
	E564SB001	0.013	U				
	E564SB002	0.011	U				
	E564SB003	0.011	U				
	E172SB002	0.013	U				
	E172SB011	0.016	U				
	E172SB013	0.014	U				
	E172SB014	0.014	U				

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
Vinyl Chloride	Surface Soil			0.43	3.8	0.0007	NA
	E172SB015	0.003	J				
	E172SB016	0.011	U				
	E172SB017	0.009	U				
	E172SB018	0.002	J				
	E172SB019	0.011	U				
	E172SB012	0.014	U				
Vinyl Chloride	Subsurface Soil					0.0007	NA
	E087SB001	0.013	U				
	E172SB001	0.012	U				
	E172SB003	0.014	U				
	E172SB004	0.014	U				
	E172SB005	0.012	U				
	E172SB006	0.012	U				
	E564SB001	0.012	U				
	E564SB002	0.011	U				
	E564SB003	0.012	U				
	E172SB002	0.013	U				
	E172SB011	0.0111	U				
	E172SB012	0.0126	U				
	E172SB013	0.0126	U				
	E172SB014	0.0104	U				
	E172SB015	0.943	U				
	E172SB016	0.0011	J				
	E172SB017	0.0082	U				
	E172SB018	0.0019	J				
E172SB019	0.0089	U					

TABLE 5-1
 Concentrations of COPCs in Surface and Subsurface Soil
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (mg/kg)	Qualifier	EPA Region III Residential RBC	EPA Region III Industrial RBC	SSL	Range of Zone E Background Concentrations
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Concentrations in bold and outlined within the table indicate exceedance of the appropriate screening criteria.

= Indicates that the analyte was detected at the concentration shown.

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.

U Indicates that the concentration was not detected.

UJ Indicates that the concentration was not detected and is estimated.

NA Not Applicable

TABLE 5-2
 Concentrations of COPCs in Shallow and Deep Groundwater Samples
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (µg/L)	Qualifier	Date Collected	EPA Region III Tap Water RBC	MCL
Arsenic	E172GW02D	18.5	=	04/02/1996	0.045	50
	E172GW02D	24.2	=	07/19/1996		
	E172GW02D	33	=	11/14/1996		
	E172GW02D	28.9	=	01/27/1997		
Manganese	E172GW02D	1,240	=	04/02/1996	5,100	NA
	E172GW02D	1,200	=	07/19/1996		
	E172GW02D	1,600	=	11/14/1996		
	E172GW02D	1,320	=	01/27/1997		
Chlorobenzene	E172GW001	110	=	04/02/1996	11	100
	E172GW001	77	=	07/19/1996		
	E172GW001	130	=	11/14/1996		
	E172GW001	330	=	01/27/1997		
	E172GW001	120	=	03/06/1998		
	E172GW001	72	=	10/12/1998		
	E172GW001	12.7	=	01/18/2002		
	E172GW002	5	U	04/02/1996		
	E172GW002	5	U	07/19/1996		
	E172GW002	5	U	11/14/1996		
	E172GW002	5	U	01/27/1997		
	E172GW002	5	U	10/12/1998		
	E172GP001	5	U	01/18/2002		
	E172GP002	21.9	=	01/18/2002		
	E172GP003	5	U	01/18/2002		
1,4-DCB	E172GW001	6	J	04/02/1996		
	E172GW001	5	J	07/19/1996		
	E172GW001	8	J	11/14/1996		
	E172GW001	14	=	01/27/1997		

TABLE 5-2
 Concentrations of COPCs in Shallow and Deep Groundwater Samples
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (µg/L)	Qualifier	Date Collected	EPA Region III Tap Water RBC	MCL
1,4-DCB	E172GW001	4.3	J	01/18/2002		
	E172GW002	10	U	04/03/1996		
	E172GW002	10	U	07/23/1996		
	E172GW002	10	U	11/15/1996		
	E172GW002	10	U	01/28/1997		
	E172GW02D	10	U	04/02/1996		
	E172GW02D	10	UJ	07/19/1996		
	E172GW02D	10	U	11/14/1996		
	E172GW02D	10	U	01/27/1997		
	E172GP001	5	U	01/18/2002		
	E172GP002	5	U	01/18/2002		
	E172GP003	5	U	01/18/2002		
1,2-DCE (Total)	E172GW001	3	=	04/02/1996	5.5	70
	E172GW001	15	=	03/06/1998		
	E172GW001	16	=	07/19/1996		
	E172GW001	21	=	11/14/1996		
	E172GW001	71	=	01/27/1997		
	E172GW001	1.1	U	01/18/2002		
	E172GW002	5	U	04/02/1996		
	E172GW002	5	U	07/19/1996		
	E172GW002	5	U	11/14/1996		
	E172GW002	5	U	01/27/1997		
	E172GP001	4.3	J	01/18/2002		
	E172GP002	4.2	J	01/18/2002		
	E172GP003	5	U	01/18/2002		
	TCE	E172GW001	5	U	04/02/1996	1.6
E172GW001		5	U	07/19/1996		
E172GW001		1	J	11/14/1996		
E172GW001		6	=	01/27/1997		

TABLE 5-2
 Concentrations of COPCs in Shallow and Deep Groundwater Samples
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (µg/L)	Qualifier	Date Collected	EPA Region III Tap Water RBC	MCL			
TCE	E172GW001	3	J	03/06/1998	1.6	5			
	E172GW001	1	J	10/12/1998					
	E172GW001	5	U	01/18/2002					
	E172GW002		U	04/02/1996					
	E172GW002	5	U	07/19/1996					
	E172GW002	5	U	11/14/1996					
	E172GW002	5	U	01/27/1997					
	E172GW002	5	U	10/12/1998					
	E172GP001	1.3	J	01/18/2002					
	E172GP003	5	U	01/18/2002					
	E172GP002	5	U	01/18/2002					
	Vinyl Chloride	E172GW001	10	U			04/02/1996	0.019	2
		E172GW001	14	=			07/19/1996		
E172GW001		35	=	11/14/1996					
E172GW001		140	=	01/27/1997					
E172GW001		26	=	03/06/1998					
E172GW001		14	=	10/12/1998					
E172GW001		2.3	J	01/18/2002					
E172GW002		10	U	04/02/1996					
E172GW002		10	U	07/19/1996					
E172GW002		10	U	11/14/1996					
E172GW002		10	U	01/27/1997					
E172GW002		5	U	10/12/1998					
E172GP001		10	U	01/18/2002					
E172GP003		4.4	J	01/18/2002					
E172GP002		10	U	01/18/2002					

TABLE 5-2
 Concentrations of COPCs in Shallow and Deep Groundwater Samples
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

Analyte	Sample Location	Concentration (µg/L)	Qualifier	Date Collected	EPA Region III Tap Water RBC	MCL
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Concentrations in bold and outlined within the table indicate exceedance of the appropriate screening criteria.

= Indicates that the analyte was detected at the concentration shown.

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.

U Indicates that the concentration was not detected.

UJ Indicates that the concentration was not detected and is estimated.

NA Not Applicable

TABLE 5-3
 UCL95 Estimate for Arsenic in Surface Soil
 RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Charleston Naval Complex

Site:	SWMU 87/172/564 (Zone E)
	Arsenic Results
Media:	Surface Soil
Units:	mg/kg
Chemical:	Arsenic
STATISTICS	
N	13
Detects	13
FOD	100%
Mean of Detect	12.79
Min of Detect	3.30
Max of Detect	66.50
Best Estimate of Mean (arithmetic)	20.1
Best Estimate of Mean (geometric)	8.0
Nondetects at 1/2 DL	YES
95% UPPER CONFIDENCE LIMITS FOR MEAN	
UCL95 Normal	21.3
<i>t</i> -statistic	1.78
UCL95 Lognormal	22.8
<i>H</i> -statistic	2.49
UCL95 Nonparametric	3.6
UCL95 Bootstrap	20
95% UPPER TOLERANCE INTERVAL	
UTL95 Normal	44.56
<i>coverage</i>	95%
UTL95 Lognormal	42.04
<i>coverage</i>	95%
UTL95 Nonparametric	66.50
<i>coverage</i>	93%
DISTRIBUTION TESTING	
Population is best described as:	LOGNORMAL
W_{normal}	0.588
W_{log}	0.879
$W_{\alpha = 0.05}$	0.866

TABLE 5-3

UCL95 Estimate for Arsenic in Surface Soil

RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Charleston Naval Complex

Site:	SWMU 87/172/564 (Zone E)
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Arsenic Results

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.

6.0 Summary of Information Related to Site Closeout Issues

6.1 RFI Status

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) addressed SWMUs/AOCs within Zone E of the CNC, including Combined SWMU 87. In accordance with the RFI completion process, if a determination of No Further Investigation (NFI) is made upon completion of the RFI, then a site may proceed to either NFA status or to a CMS. Evaluation of the RFI data for Combined SWMU 87 identified several COCs for surface soils, subsurface soils, and groundwater. Arsenic and dieldrin were identified as soils COCs for the unrestricted land use scenario. Several VOCs have been identified as shallow groundwater COCs. The remaining subsections address the issues that the BCT agreed to evaluate prior to site closeout. Although a No Further Action (NFA) designation is not being requested, these issues are presented to facilitate decision-making at the site.

6.2 Presence of Inorganics in Groundwater

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

There were no detections of antimony in shallow or deep wells above the laboratory detection limits. There were no detections of arsenic above its MCL in samples from the shallow or deep groundwater monitoring wells. There were no detections of thallium above the MCL for shallow groundwater. There was only one detection of thallium at 4 µg/L above the MCL of 2 µg/L in deep groundwater, but this detection was below the maximum Zone E deep groundwater background concentration for thallium of 7.4 µg/L. Intermittent detections of thallium in shallow and deep groundwater at the site above the MCL do not point to a site-specific source, but can be attributed to natural occurrence. Further evaluation of this issue is not warranted.

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

One groundwater DPT sample from LE037GP036 was collected as part of the Zone L, SWMU 37 sanitary sewer investigations. This sample location is shown in Figure 6-1. VOCs 1,1-DCA, cis-1,2-DCE, chlorobenzene and TCE were detected above laboratory detection limits in this sample.

1,1-DCA was detected at 17 µg/L, below its EPA Region III tap water RBC (with a HI=0.1) of 80 mg/L. Cis-1,2-DCE was detected at 17.9 µg/L, below its MCL of 70 µg/L.

Chlorobenzene was detected at 7.06 µg/L, below its MCL of 100 µg/L and TCE was detected at 6.93 µg/L, above its MCL of 5 µg/L. These detections are shown in Table 6-1.

The DPT groundwater data indicate that shallow groundwater has been impacted with low-level TCE at this location.

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

Storm sewers run adjacent to the site on the east. SWMU 172 reportedly used to discharge to two storm drains, as shown in Figure B-2. One DPT groundwater sample along the storm sewer line was collected within the footprint of AOC 564, at LE699GP058, to assess groundwater quality in the vicinity of the storm sewer. This DPT groundwater sample indicated the presence of the VOCs chlorobenzene, 1,1, DCA ,1,2,DCE, PCE, and TCE.

1,1-DCA was detected at 17.6 µg/L, below its tapwater RBC (with a HI=0.1) of 80 mg/L. cis-1,2-DCE was detected at 122 µg/L, above its MCL of 70 µg/L. Chlorobenzene was detected at 11.9 µg/L, below its MCL of 100 µg/L. PCE was detected at 9.4 µg/L, above its MCL of 5 µg/L. TCE was detected at 11.9 µg/L, above its MCL of 5 µg/L.

The DPT groundwater data indicate that shallow groundwater has been impacted with VOCs at this location. 1,2-DCE and chlorobenzene were identified in previous sections as shallow groundwater COCs at this site. These detections are shown in Table 6-1.

The Navy/EnSafe team is also conducting an assessment of any COCs that may be discharging via the CNC storm drainage system. This assessment has included the collection of wet weather stormwater discharges from outfalls at the CNC to the Cooper River. If this assessment identifies any COPCs from the stormwater drainage system the services this portion of CNC, any potential linkages from Combined SWMU 87 to these COPCs will be assessed at that time.

1 **6.5 Potential Linkage to AOC 504, Investigated Railroad Lines** 2 **at the CNC**

3 The nearest railroad line to Combined SWMU 87 is approximately 25 feet northeast of the
4 site. There is no known linkage between Combined SWMU 87 and the investigated railroad
5 lines of AOC 504, thus further evaluation of this issue is not warranted.

6 **6.6 Potential Migration Pathways to Surface Water Bodies at** 7 **the CNC**

8 The nearest surface water body to Combined SWMU 87 is the Cooper River, which lies
9 approximately 250 feet northeast of the site. The only potential migration pathway from the
10 site to surface water is via overland flow via stormwater runoff. The entire site is covered
11 with buildings and pavement, which eliminates contact of surface soil with stormwater.
12 Similarly, runoff directed to the storm sewer system, which discharges to the Cooper River,
13 does not contact the surface soil. No further evaluation of a potential pathway for
14 contaminant migration via stormwater runoff is warranted.

15 **6.7 Potential Contamination in Oil/Water Separators (OWSs)**

16 An aboveground OWS located at AOC 564 appears to have been removed, based on the
17 visual site inspection conducted by CH2M-Jones during April 2001, as part of the
18 Environmental Baseline Survey. There is no evidence of any impact of the site soil and
19 groundwater from the operations of the OWS. Therefore, further evaluation of this issue is
20 not warranted.

21 **6.8 Land Use Controls (LUCs)**

22 The CNC BCT has agreed that all of Zone E will have at least some LUCs and restrictions.
23 At a minimum, these LUCs are likely to include restrictions against residential land use.
24 The specific type of LUCs to be applied at this site will be further evaluated as part of the
25 CMS process.

TABLE 6-1
 Summary of Detected VOCs from Zone L Sewer Investigation DPT Samples
RFI Report Addendum and CMS Work Plan, Combined SWMU 87, Zone E, Charleston Naval Complex

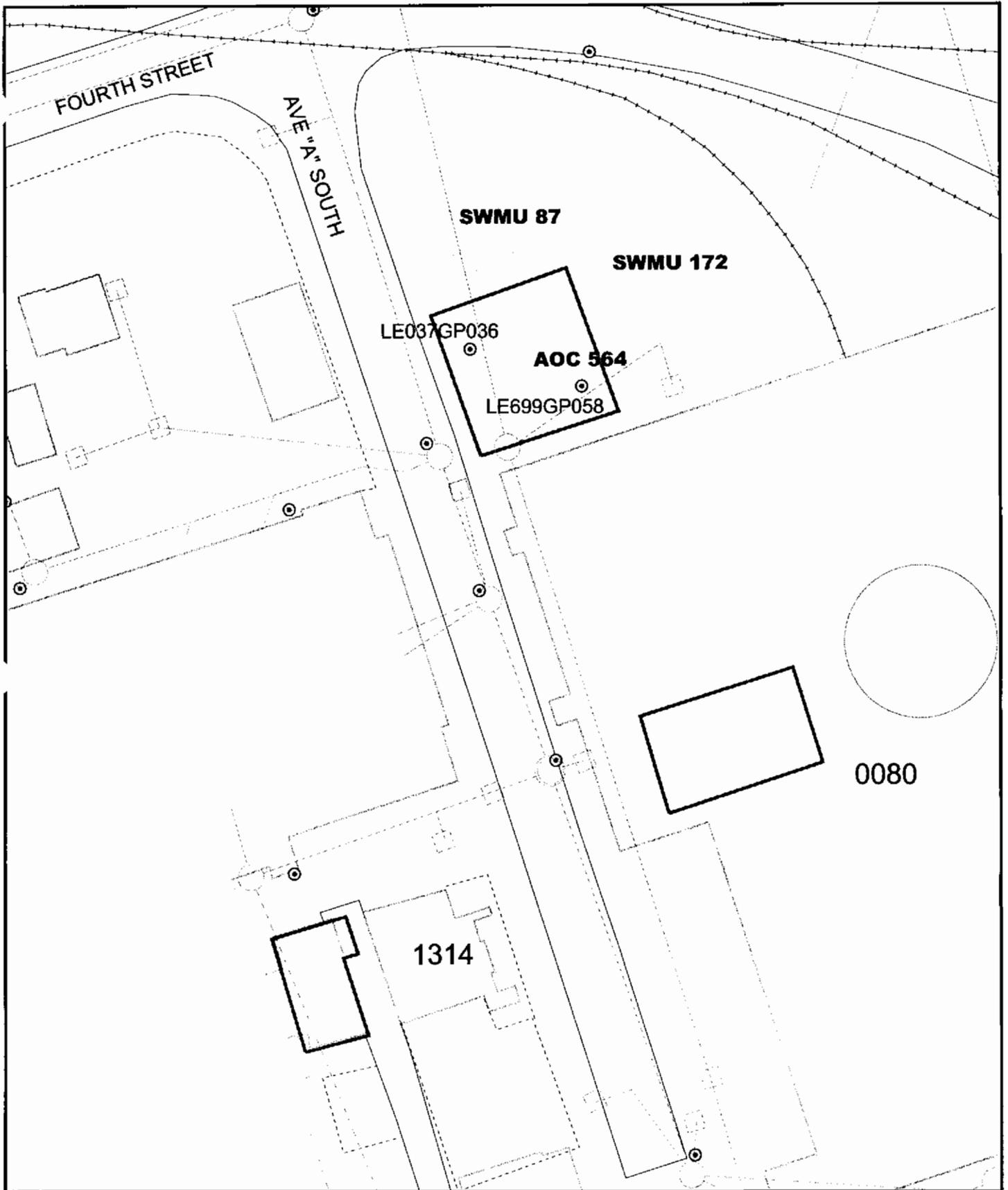
Analyte	Sample Location	Concentration ($\mu\text{g/L}$)	Qualifier	Date Collected	EPA Region III Tap Water RBC	MCL
1,1-DCA	LE037GP036	17.1	=	07/21/1997	80	NA
	LE699GP058	17.6	=	07/21/1997		
Chlorobenzene	LE037GP036	7.06	=	07/21/1997	110	100
	LE699GP058	11.9	=	07/21/1997		
cis-1,2-DCE	LE037GP036	17.9	=	07/21/1997	6.1	70
	LE699GP058	122	=	07/21/1997		
PCE	LE699GP058	9.4	=	07/21/1997	1.1	5
TCE	LE037GP036	6.93	=	07/21/1997	1.6	5
	LE699GP058	11.9	=	07/21/1997		

Concentrations in bold and outlined within the table indicate exceedance of the appropriate screening criteria.

= Indicates that the analyte was detected at the concentration shown.

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



- Railroads
- Storm Sewer Line
- Storm Drain Basin
- Groundwater DPT Sample Location
- Roads - Lines
- AOC Boundary
- SWMU Boundary
- Buildings

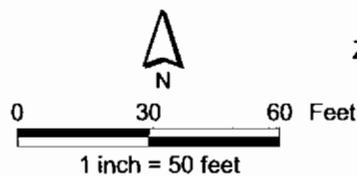


Figure 6-1
Zone L Groundwater DPT Sample Locations
Combined SWMU 87 Area
Charleston Naval Complex

1 7.0 Recommendations

2 SWMU 87 is a former less-than-90-day accumulation area that was once part of the
3 Charleston Naval Shipyard hazardous waste management system. Located north of
4 Building 80, the unit is a metal building with an asphalt foundation. Wastes were
5 accumulated in closed, palletized 55-gallon drums and palletized plastic bags. The
6 accumulation area was taken out of service in March 1994 and is currently a paved area.

7 SWMU 172 consists of a former steam-cleaning area north of Building 80. Steam cleaning
8 was performed on various types of equipment including small engines, generators, and
9 construction equipment. The unit consisted of a concrete-paved area designed with curbing
10 and sloping surfaces to drain liquids into two storm drains located between the concrete-
11 paved area and Building 80, on the south side of the steam-cleaning area. This unit did not
12 have an enclosure or a roof. Currently, no steam-cleaning operations exist at SWMU 172
13 and the paved area is being used to store equipment.

14 AOC 564 consisted of a 300-gallon OWS north of Building 80. Wastewater from machining
15 and parts-cleaning in Building 80 drained onto a sloped asphalt ramp which fed into an
16 exterior drain connected to the OWS. At the time of the RFI, the OWS had been in operation
17 for more than 25 years. This OWS was removed by the Navy/DET, as UST No. 38-1,
18 between January and March 1997, as further described in Section 3.0 of this report.

19 The *Zone E RFI Report, Revision 0* identified chlorobenzene, 1,4-DCB, and 1,2-DCE (total) in
20 shallow groundwater, and arsenic and manganese in deep groundwater as the COCs for the
21 Combined SWMU 87. Based on an evaluation of the data and site conditions as discussed
22 herein, arsenic and dieldrin in surface soil are identified as COCs for the unrestricted land
23 use scenario.

24 Several VOCs (chlorobenzene, PCE, TCE, DCE, and vinyl chloride) were identified as COCs
25 for groundwater. A CMS Work Plan is included in Section 8.0 of this document to describe
26 the steps for a focused CMS for soil and groundwater COCs at Combined SWMU 87.

1 **8.0 CMS Work Plan for Combined SWMU 87**

2 Arsenic and dieldrin were identified as soil COCs for the unrestricted land use scenario.
3 Several VOCs (chlorobenzene, PCE, TCE, 1,2-DCE, and vinyl chloride) have been identified
4 as COCs in shallow groundwater at this site. Because the site is paved and shallow
5 groundwater at CNC is not being used for potable consumption, there is currently no
6 unacceptable exposure or risk from these COCs; however, it is feasible that in the future,
7 should site conditions change, some exposure could occur. Therefore, a CMS should be
8 conducted to evaluate potential corrective measures and identify an appropriate remedy for
9 the site.

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

12 **8.1 Remedial Action Objectives**

13 Remedial action objectives (RAOs) are medium-specific goals that the remedial actions are
14 designed to accomplish in order to protect human health and the environment by
15 preventing or reducing exposures under current and future land use conditions. The RAOs
16 identified for the surface soil and groundwater at Combined SWMU 87 are being chosen to
17 prevent ingestion of soil and groundwater containing COCs at unacceptable levels. All of
18 Zone E is expected to undergo land use controls and such LUCs will be applicable for soils
19 at this site also.

20 **8.2 Remedial Goal Options and Media Cleanup Standards**

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

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

1 health and the environment, while achieving compliance with applicable state and federal
 2 standards.

3 The exposure media of concern for this site are surface soil impacted by arsenic and
 4 dieldrin, and groundwater impacted by low-levels of 1,2-DCE, chlorobenzene, PCE, TCE
 5 and vinyl chloride. Because this site is located within a highly developed area of the CNC
 6 and there are no surface water bodies in the immediate vicinity of the site, ecological
 7 exposures were not considered applicable for evaluation.

8 For the chemicals identified as COCs in soil and shallow groundwater, the following MCSs
 9 are proposed:

COC	Target MCS
Soil	
Arsenic	20 mg/kg - EPA Region IV acceptable level for unrestricted land use, where arsenic background concentrations exceed RBCs.
Dieldrin	Site-specific SSL for the unpaved scenario (0.012 mg/kg).
Groundwater	
PCE	MCL for PCE - 5 ug/L
TCE	MCL for TCE - 5 ug/L
1,2-DCE	MCL for cis-1,2-DCE of 70 µg/L
Chlorobenzene	MCL for chlorobenzene of 100 µg/L
Vinyl Chloride	MCL for vinyl chloride of 2 µg/L

10

11 8.3 Potential Remedies to Evaluate

12 Because of the small size of this site and the relatively low-levels of contamination in soil
 13 and in groundwater, the list of practicable remedial alternatives for this site is limited.

14 Because all of Zone E will undergo LUCs, and the exceedance of screening criteria for
 15 arsenic and dieldrin are localized, the presumptive remedy that will be evaluated as part of
 16 the CMS for soil will be LUCs (such as maintaining pavement at the site and preventing use
 17 for residential purposes).

18 The two presumptive remedies for groundwater that will be evaluated as part of the CMS
 19 include:

- 20 • In situ treatment of chlorinated VOCs, and
- 21 • Monitored natural attenuation (MNA)

8.4 Focused CMS Approach

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

1. The corrective measure alternatives described above will be screened using several criteria and decision factors.
2. A preferred corrective measure alternative will be selected.
3. The CMS and preferred corrective measure alternative will be documented in the CMS report.

8.5 Approach to Evaluating Corrective Measure Alternatives

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

1. Protecting human health and the environment.
2. Attaining media cleanup standards (RGOs).
3. Controlling the source of releases to minimize future releases that may pose a threat to human health and the environment.
4. Complying with applicable standards for the management of wastes generated by remedial activities.
5. Other factors include (a) long-term reliability and effectiveness; (b) reduction in toxicity, mobility, or volume of wastes; (c) short-term effectiveness; (d) implementability; and (e) cost.

Each of the five standards is defined in more detail below:

1. **Protecting human health and the environment.** The alternatives will be evaluated on the basis of their ability to protect human health and the environment. The ability of an alternative to achieve this standard may or may not be independent of its ability to achieve the other four standards. For example, an alternative may be protective of human health, but may not be able to attain the MCSs if the MCSs are not directly tied to protecting human health.
2. **Attaining media cleanup standards (RGOs).** The alternatives will be evaluated on the basis of their ability to achieve the RGOs defined in this CMS Work Plan. Another

1 aspect of this standard is the timeframe to achieve the RGOs. Estimates of the timeframe
2 for the alternatives to achieve RGOs will be provided.

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

5 4. **Complying with applicable standards for management of wastes.** This standard deals
6 with the management of wastes derived from implementing the alternatives, for
7 example, treatment or disposal of excavated material. The soil removal alternative will
8 be designed to comply with all applicable standards for management of remediation
9 wastes. Consequently, this standard will not be explicitly included in the detailed
10 evaluation presented in the CMS but will be part of a work plan specific to the removal
11 action should a removal action become the chosen alternative.

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

14 a. Long-term reliability and effectiveness

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

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

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

23 c. Short-term effectiveness

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

27 d. Implementability

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

32 e. Cost

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

8 In addition to the criteria described above, the alternatives will be evaluated for their ability
9 to achieve all contractual obligations of CH2M-Jones and the Navy.

10 **8.6 Focused CMS Report**

11 A focused CMS Report will be prepared to present the identification, development, and
12 evaluation of potential corrective measures for Combined SWMU 87. A proposed outline of
13 the 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 SWMU 87/SWMU 172/AOC 564
RFI Report Addendum & CMS Work Plan, SWMU 87/SWMU 172/AOC 564, 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 Alternatives
3.1	Approach
3.2	Evaluation Criteria
3.3	Description of Alternatives
3.3.1	Soil Alternative 1: Land Use Controls
3.3.2	Groundwater Alternative 1: In situ treatment of chlorinated VOCs in groundwater
3.3.3	Groundwater Alternative 2: Alternative 2: Monitored Natural Attenuation
3.4	Detailed Analysis of Alternatives
3.4.1	Analysis of Alternative 1
3.4.2	Analysis of Alternative 2
3.5	Comparative Analysis of Alternatives
4.0	Recommended Remedial Alternative
5.0	References
Appendix A	Corrective Measure Alternative Cost Estimates^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 CH2M-Jones. *Technical Memorandum: Results from Additional Background Sampling of the CNC*
10 *Railroad Lines and Naval Annex (Zone K)*. CNC. August 2001.
- 11 South Carolina Department of Health and Environmental Control, Final RCRA Part B
12 Permit No. SC0 170 022 560.

**Response To Comments from Charles B. Watson — SCDHEC
Draft Zone E RCRA Facility Investigation Report
(EnSafe, 1997)**

SWMU 87/172, AOC 564

SCDHEC Comment 23:

Page 10.11-16, The first paragraph states "No MCL has been established for chlorobenzene". The Department has informed the Navy in previous reviews that an MCL of 100 ug/L has been established for Monochlorobenzene. The report should be revised to reflect the proper information.

EnSafe/Navy Response 23:

The Final Zone E RFI Report will be revised to reflect this information.

CH2M-Jones Response 23:

The MCL for chlorobenzene of 100 µg/L has been considered during screening as part of the RFI Report Addendum for this site.

Table 10.11.A
 Chemicals Present in Site Samples
 SWMUs 87, 172; AOC 564 - Surface Soil
 NAVBASE - Charleston
 Charleston, SC

Parameter	Frequency of Detection		Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration			Units	Number Exceeding		
	Res.	Ind.	Res.	Ind.		Res.	Ind.	Residential RBC	Industrial RBC	Reference		Res.	Ind.	Ref.
Carcinogenic PAHs														
B(a)P Equiv.	8	10	63.064	533.74	234.57	970.62	1016.84	88	780	NA	UG/KG	5		
Benzo(a)anthracene	6	10	53	300	154.83	370	590	880	7800	NA	UG/KG			
Benzo(a)pyrene	8	10	62	370	163.00	420	440	88	780	NA	UG/KG	4		
Benzo(b)fluoranthene	5	10	58	330	181.80	360	590	880	7800	NA	UG/KG			
Benzo(k)fluoranthene	7	10	41	340	155.14	420	590	8800	78000	NA	UG/KG			
Chrysene	8	10	61	340	160.13	420	440	88000	780000	NA	UG/KG			
Dibenz(a,h)anthracene	4	10	41	92	75.50	370	590	88	780	NA	UG/KG	2		
Indeno(1,2,3-cd)pyrene	6	10	48	200	124.33	410	590	880	7800	NA	UG/KG			
TCDD Equivalents														
Dioxin Equiv.	2	2	0.1008	1.4468	0.77	NA	NA	1000	1000	NA	NG/KG			
Inorganics														
Aluminum (Al)	10	10	4080	25700	9655.00	NA	NA	7800	100000	26600	MG/KG	3		
Antimony (Sb)	2	10	0.75	5.1	2.93	0.57	4.8	3.1	82	1.77	MG/KG	1		1
Arsenic (As)	10	10	3.3	66.5	14.84	NA	NA	0.43	3.8	23.9	MG/KG	10	8	1
Barium (Ba)	10	10	11.5	49.7	31.77	NA	NA	550	14000	130	MG/KG			
Beryllium (Be)	10	10	0.31	1.6	0.71	NA	NA	0.15	1.3	1.7	MG/KG	10	1	
Cadmium (Cd)	1	10	0.64	0.64	0.64	0.13	0.64	3.9	100	1.5	MG/KG			
Calcium (Ca)	10	10	5650	28100	13622.00	NA	NA	NA	NA	NA	MG/KG			
Chromium (Cr)	10	10	10.2	143	47.83	NA	NA	39	1000	94.6	MG/KG	4		2
Chromium (Hexavalent)	0	2	NA	NA	NA	0.059	0.067	39	1000	NA	MG/KG			
Cobalt (Co)	10	10	2	24.3	9.23	NA	NA	470	12000	19	MG/KG			2
Copper (Cu)	10	10	3.3	142	34.63	NA	NA	310	8200	66	MG/KG			1
Cyanide (CN)	8	10	0.34	1	0.59	0.25	0.26	160	4100	0.5	MG/KG			6
Iron (Fe)	10	10	4280	34700	12875.00	NA	NA	NA	NA	NA	MG/KG			
Lead (Pb)	10	10	6.9	132	54.73	NA	NA	400	1300	265	MG/KG			
Magnesium (Mg)	10	10	888	4460	2125.80	NA	NA	NA	NA	NA	MG/KG			
Manganese (Mn)	10	10	46.2	495	190.11	NA	NA	180	4700	302	MG/KG	4		3
Mercury (Hg)	8	10	0.03	0.62	0.30	0.02	0.03	2.3	61	2.6	MG/KG			
Nickel (Ni)	9	10	4	14.1	8.83	6.9	6.9	160	4100	77.1	MG/KG			
Potassium (K)	10	10	254	1930	1013.10	NA	NA	NA	NA	NA	MG/KG			
Selenium (Se)	1	10	0.62	0.62	0.62	0.58	0.79	39	1000	1.7	MG/KG			
Silver (Ag)	2	10	2	2.2	2.10	0.22	0.32	39	1000	NA	MG/KG			
Sodium (Na)	10	10	236	1750	536.10	NA	NA	NA	NA	NA	MG/KG			
Thallium (Tl)	1	10	0.85	0.85	0.85	0.55	0.79	0.63	16	2.8	MG/KG	1		
Tin (Sn)	10	10	2.8	10.1	4.99	NA	NA	4700	6100	59.4	MG/KG			
Vanadium (V)	10	10	7.6	78.5	27.71	NA	NA	55	1400	94.3	MG/KG	1		
Zinc (Zn)	10	10	13.7	295	105.46	NA	NA	2300	61000	827	MG/KG			
Pesticides														
4,4'-DDD	3	10	13	156	61.33	2.7	4.5	2700	24000	NA	UG/KG			
4,4'-DDE	3	10	8.7	664	238.43	2.7	4.5	1900	17000	NA	UG/KG			
4,4'-DDT	1	10	70.3	70.3	70.30	2.7	4.5	1900	17000	NA	UG/KG			
alpha-Chlordane	2	10	3.22	48.8	26.01	1.4	2.3	470	2200	NA	UG/KG			
delta-BHC	1	10	4.83	4.83	4.83	1.4	2.3	100	910	NA	UG/KG			
Dieldrin	1	10	290	290	290.00	2.7	4.5	40	360	NA	UG/KG	1		
Endrin	1	10	14.3	14.3	14.30	2.7	4.5	2300	61000	NA	UG/KG			
Endrin aldehyde	1	10	4.19	4.19	4.19	2.7	4.5	2300	61000	NA	UG/KG			
gamma-Chlordane	2	10	3.25	55.5	29.38	1.4	2.3	470	2200	NA	UG/KG			
Semivolatile Organics														
1,2-Dichlorobenzene	2	10	120	3500	1810.00	360	460	700000	18000000	NA	UG/KG			
2-Chlorophenol	1	10	190	190	190.00	360	590	39000	1000000	NA	UG/KG			
2-Methylnaphthalene	1	10	1900	1900	1900.00	360	590	310000	8200000	NA	UG/KG			
4-Chloro-3-methylphenol	1	10	160	160	160.00	360	590	NA	NA	NA	UG/KG			
Acenaphthene	1	10	120	120	120.00	360	590	470000	12000000	NA	UG/KG			
Anthracene	1	10	60	60	60.00	360	590	2300000	61000000	NA	UG/KG			
Benzo(g,h,i)perylene	7	10	57	220	134.57	420	590	310000	8200000	NA	UG/KG			
Dibenzofuran	1	10	120	120	120.00	360	590	31000	820000	NA	UG/KG			
Di-n-octyl phthalate	1	10	54	54	54.00	360	590	160000	4100000	NA	UG/KG			
Fluoranthene	8	10	56	680	264.75	420	440	310000	8200000	NA	UG/KG			
Naphthalene	1	10	1800	1800	1800.00	360	590	310000	8200000	NA	UG/KG			

Table 10.11.A
 Chemicals Present in Site Samples
 SWMUs 87, 172; AOC 564 - Surface Soil
 NAVBASE - Charleston
 Charleston, SC

Parameter	Frequency of Detection	Range of Detection		Average Detected Concentration	Range of SQL		Screening Concentration			Units	Number Exceeding			
							Residential RBC	Industrial RBC	Reference		Res.	Ind.	Ref.	
Pentachlorophenol	1	10	69	69	69.00	1800	2800	5300	48000	NA	UG/KG			
Phenanthrene	6	10	70	310	187.00	370	590	310000	8200000	NA	UG/KG			
Pyrene	8	10	50	610	258.63	420	440	230000	6100000	NA	UG/KG			
Volatile Organics														
1,2-Dichloroethene (total)	2	10	31	58	44.50	5	7	70000	1800000	NA	UG/KG			
Acetone	8	10	10	300	123.13	12	13	780000	20000000	NA	UG/KG			
Bromodichloromethane	1	10	3	3	3.00	5	32	10000	92000	NA	UG/KG			
Chlorobenzene	1	10	130	130	130.00	5	32	160000	4100000	NA	UG/KG			
Chloroform	1	10	12	12	12.00	5	32	100000	940000	NA	UG/KG			
Ethylbenzene	1	10	17	17	17.00	5	9	780000	20000000	NA	UG/KG			
Methylene chloride	6	10	2	18	9.50	6	32	85000	760000	NA	UG/KG			
Tetrachloroethene	1	10	520	520	520.00	5	9	12000	110000	NA	UG/KG			
Toluene	1	10	16	16	16.00	5	9	1600000	41000000	NA	UG/KG			
Xylene (Total)	1	10	180	180	180.00	5	9	16000000	100000000	NA	UG/KG			

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

Table 10.11.10.4
Chemicals Present in Site Samples
SWMUs 87, 172; AOC 584 - Groundwater
NAVBASE - Charleston
Charleston, SC

Parameter	Frequency of Detection		Range of Detection	Average Detected Concentration	Range of SQL	Screening Conc.		Units	Number Exceeding		
						Residential RBC	Reference		Res.	Ref.	
Deep wells											
Inorganics											
Arsenic (As)	*	1	1	18.5 - 18.5	18.5	NA - NA	0.045	16.4	UG/L	1	1
Calcium (Ca)	N	1	1	216000 - 216000	216000	NA - NA	NA	NA	UG/L		
Cobalt (Co)		1	1	18.1 - 18.1	18.1	NA - NA	220	12.9	UG/L		1
Iron (Fe)	N	1	1	7040 - 7040	7040	NA - NA	NA	NA	UG/L		
Magnesium (Mg)	N	1	1	30500 - 30500	30500	NA - NA	NA	NA	UG/L		
Manganese (Mn)	*	1	1	1240 - 1240	1240	NA - NA	84	869	UG/L	1	1
Nickel (Ni)		1	1	18.7 - 18.7	18.7	NA - NA	73	42.2	UG/L		
Sodium (Na)	N	1	1	408000 - 408000	408000	NA - NA	NA	NA	UG/L		
Volatile Organics											
1,2-Dichloroethene (total)		1	1	2 - 2	2	NA - NA	5.5	NA	UG/L		
Shallow Wells											
Inorganics											
Aluminum (Al)		1	2	1010 - 1010	1010	44.1 - 44.1	3700	2810	UG/L		
Arsenic (As)		1	2	5.1 - 5.1	5.1	5 - 5	0.045	18.7	UG/L	1	
Barium (Ba)		1	2	18.9 - 18.9	18.9	14.1 - 14.1	260	211	UG/L		
Calcium (Ca)	N	1	2	49500 - 49500	49500	14300 - 14300	NA	NA	UG/L		
Cobalt (Co)		1	2	16.8 - 16.8	16.8	2 - 2	220	2.5	UG/L		1
Copper (Cu)		1	2	2 - 2	2	2 - 2	150	2.7	UG/L		
Iron (Fe)	N	2	2	2200 - 6100	4150	NA - NA	NA	NA	UG/L		
Magnesium (Mg)	N	2	2	6680 - 11700	9190	NA - NA	NA	NA	UG/L		
Manganese (Mn)		2	2	88 - 261	174.5	NA - NA	84	2560	UG/L	2	
Nickel (Ni)		1	2	9.3 - 9.3	9.3	1 - 1	73	15.2	UG/L		
Potassium (K)	N	1	2	5970 - 5970	5970	5910 - 5910	NA	NA	UG/L		
Sodium (Na)	N	2	2	128000 - 452000	290000	NA - NA	NA	NA	UG/L		

Table 10.11.10.4
 Chemicals Present in Site Samples
 SWMUs 87, 172; AOC 564 - Groundwater
 NAVBASE - Charleston
 Charleston, SC

Parameter	Frequency of Detection		Range of Detection	Average Detected Concentration	Range of SQL	Screening Conc.		Units	Number Exceeding	
						Residential RBC	Reference		Res.	Ref.
Vanadium (V)	1	2	2.7 - 2.7	2.7	1 - 1	26	11.4	UG/L		
Zinc (Zn)	1	2	44.4 - 44.4	44.4	4 - 4	1100	27.3	UG/L		1
Semivolatile Organics										
1,2-Dichlorobenzene	1	2	10 - 10	10	10 - 10	27	NA	UG/L		
1,3-Dichlorobenzene	1	2	2 - 2	2	10 - 10	54	NA	UG/L		
1,4-Dichlorobenzene	*	1	6 - 6	6	10 - 10	0.44	NA	UG/L		1
bis(2-Ethylhexyl)phthalate (BEHP)	1	2	2 - 2	2	10 - 10	4.8	NA	UG/L		
Volatile Organics										
1,1-Dichloroethane	1	2	3 - 3	3	5 - 5	81	NA	UG/L		
1,2-Dichloroethene (total)	*	1	37 - 37	37	5 - 5	5.5	NA	UG/L		1
Chlorobenzene	*	1	110 - 110	110	5 - 5	3.9	NA	UG/L		1

Notes:

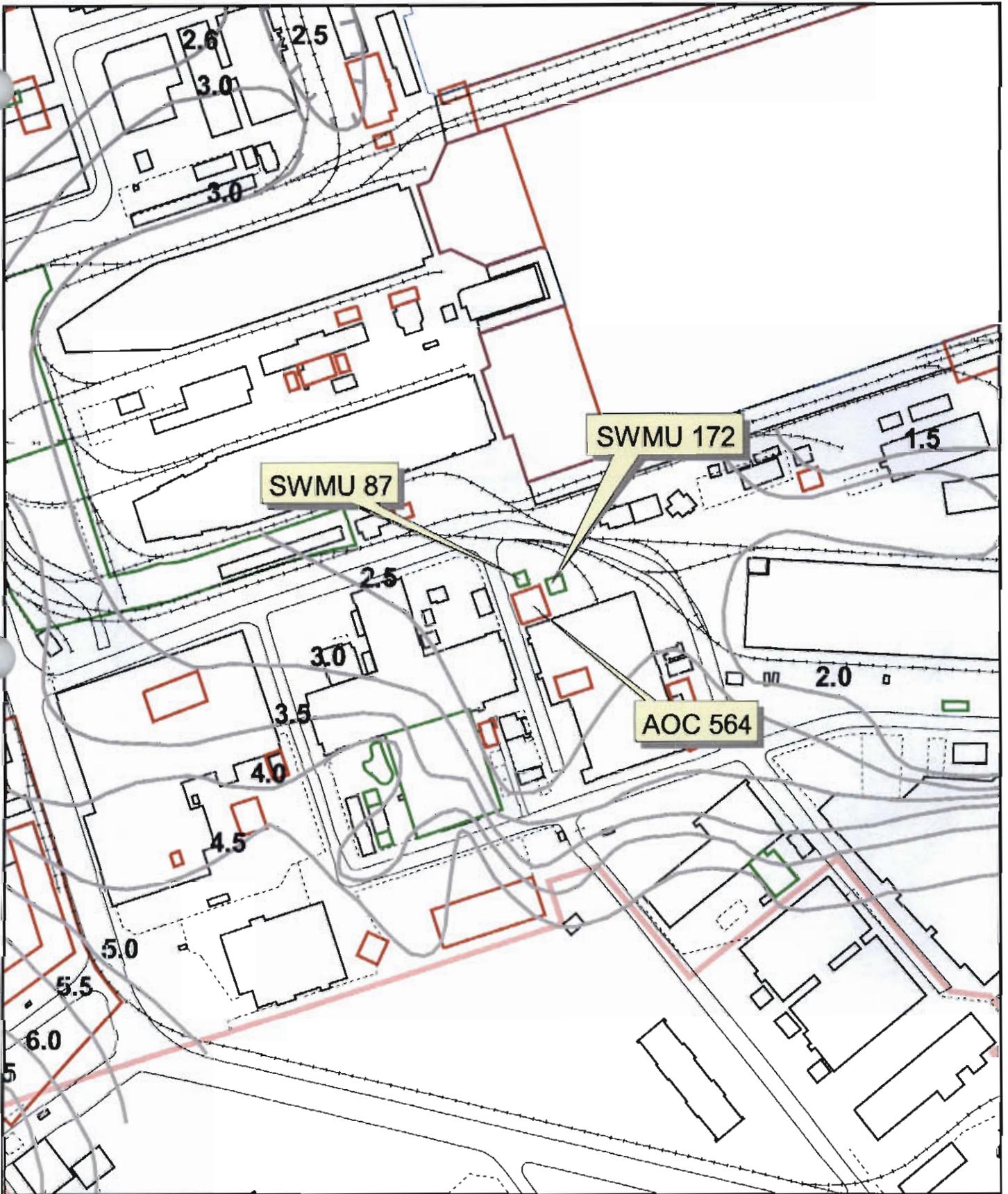
* - Identified as a COPC

N - Essential nutrient

UG/L - micrograms per liter

SQL - Sample quantitation limit

NA - Not applicable



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

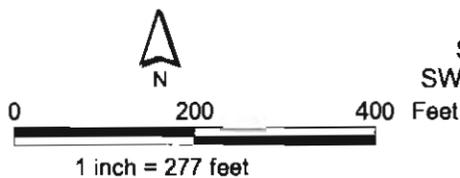
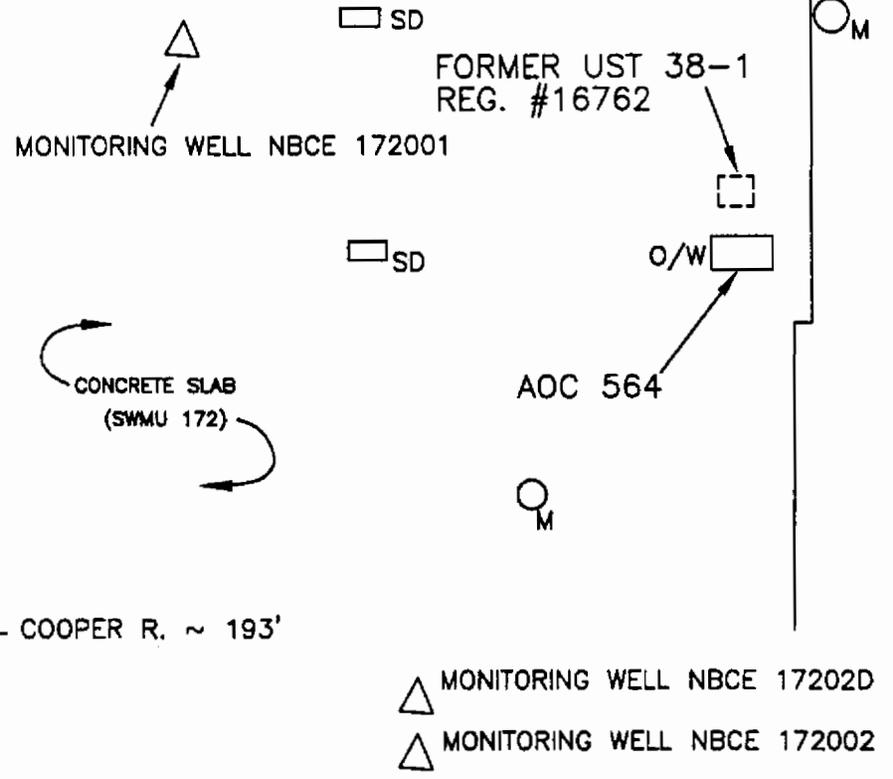


Figure B-1
 Shallow Groundwater Contour Map
 SWMU 87, SWMU 172, and AOC 564
 Charleston Naval Complex

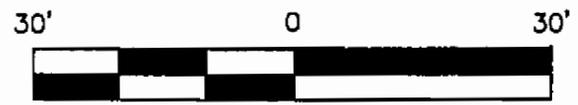
BUILDING 80

BLDG 9

AVENUE "A" SOUTH



- LEGEND
- M - MANHOLE
 - O/W - OILY WATER SEPARATOR
 - SD - STORM DRAIN
 - ST - STEAM LINE



GRAPHIC SCALE

Figure B-2
 Combined SWMU 87 Area
 Showing Storm Drains associated with
 SWMU 172, Zone E,
 Charleston Naval Com

Source:	SPORTENVDETHASN	
	1899 North Hobson Avenue	
	North Charleston, SC 29405-2106	
DWG DATE:	31 MAR 97	DWG NAME:
		138_2



Building 80 is the large building in the background.

BUILDING MATRIX

Building Number	80
Square Footage	54,037
Map Location	H-39
Zone	E
EBS Binder No.	44
Street Address	1320 Pipefitter Street
Use:	Outside machine shop
Year Built:	1943
Historic (Y/N)	Y
Notes:	Site of PSWMU 47, satellite accumulation area of POI.s, paints & solvents. Adjacent to AOC 564, building 80 oil/water separator.

South Carolina Department of Health and Environmental Control (S.C.D.H.E.C.)
Underground Storage Tank (UST) Assessment Report

Date Received

State Use Only

Submit Completed Form to:
UST Regulatory Section
SCDHEC
2600 Bull Street
Columbia, South Carolina 29201
Telephone (803) 734-5331

I. OWNERSHIP OF UST(S)

Agency/Owner: Southern Division, Naval Facilities Engineering Command, Caretaker Site Office			
Mailing Address:		P.O. Box 190010	
City:	N. Charleston	State:	SC
		Zip Code:	29419-9010
Area Code:	803	Telephone Number:	743-9985
Contact Person:	LCDR Paul Rose		

II. SITE IDENTIFICATION AND LOCATION

Site I.D. #:	16762		
Facility Name:	Charleston Naval Shipyard, Building 80		
Street Address:	Fourth Street		
City:	North Charleston, 29405-2413	County:	Charleston

III. CLOSURE INFORMATION

Closure Started: 29 Jan 1997	Closure Completed: 3 Mar 1997
Number of USTs Closed: 1	
N/A	SPORTENVDETCNASN
Consultant	UST Removal Contractor

IV. CERTIFICATION (Read and Sign after completing entire submittal)

<small>I certify that I have personally examined and am familiar with the information submitted in this and all attached documents; and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate and complete.</small>	
LCDR Paul Rose	
Name (Type or Print)	
Signature	

V. UST INFORMATION

- A. Product.....
- B. Capacity.....
- C. Age.....
- D. Construction Material.....
- E. Month/Year of Last Use.....
- F. Depth (ft.) To Base of Tank.....
- G. Spill Prevention Equipment Y/N.....
- H. Overfill Prevention Equipment Y/N.....
- I. Method of Closure Removed/Filled.....
- J. Visible Corrosion or Pitting Y/N.....
- K. Visible Holes Y/N.....

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
Waste oil						
300 gal.						
1967						
Steel						
Unk.						
4.5'						
N						
N						
R						

L. Method of disposal for any USTs removed from the ground (attach disposal manifests)

UST 38-1 was removed, drained, cut open at both ends, and cleaned with a steam cleaner. It was then cut up for recycling as scrap metal. (See Attachment III.)

M. Method of disposal for any liquid petroleum, sludges, or waste waters removed from the USTs (attach disposal manifests)

The residual fuel oil, waste water, and sludge were recycled.

N. If any corrosion, pitting, or holes were observed, describe the location and extent for each UST

No corrosion, pitting, or holes were found, but the tank sheet metal was very thin. One end of the tank was inadvertently creased and punctured during the removal process. Approximately one quart of product was released. This was collected with absorbent pads, and the affected soil was collected with a shovel.

VI. PIPING INFORMATION

- A. Construction Material.....
- B. Distance from UST to Dispenser.....
- C. Number of Dispensers.....
- D. Type of System P/S.....
- E. Was Piping Removed from the Ground? Y/N....
- F. Visible Corrosion or Pitting Y/N.....
- G. Visible Holes Y/N.....
- H. Age.....

Note 1: UST 38-1 was a gravity fed waste oil collection tank for an oily water separator.

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
Steel						
3' see note						
1 see note						
see note						
Y see VII.						
N						
N						
1967						

- I. If any corrosion, pitting, or holes were observed, describe the location and extent for each line.

The piping was corroded and pitted, but no holes were found.

VII. BRIEF SITE DESCRIPTION AND HISTORY

Building 80 is the former Marine Machinery Repair Shop of the Charleston Naval Shipyard. Tank 38-1 was a regulated (SCDHEC #16762), gravity fed, waste oil collection tank for an oily water separator associated with Building 80. The oily water separator has been designated AOC (Area of Concern) 564 and the concrete wash down facility located adjacent to the oily water separator has been designated SWMU (Solid Waste Management Unit) 172 by the RCRA (Resource Conservation and Recovery Act) Facility Assessment of Naval Base Charleston.

The UST ventilation line and two oily water separator ventilation lines were removed within the UST excavation. But the three ventilation lines have been left intact and permanently capped at both ends from the UST excavation to Building 80, because they are embedded in the concrete slab and cross beneath an air conditioning unit.

VIII. SITE CONDITIONS

Yes No Unk

	Yes	No	Unk
<p>A. Were any petroleum-stained or contaminated soils found in the UST excavation, soil borings, trenches, or monitoring wells?</p> <p>If yes, indicate depth and location on the site map.</p>		X	
<p>B. Were any petroleum odors detected in the excavation, soil borings, trenches, or monitoring wells?</p> <p>If yes, indicate location on site map and describe the odor (strong, mild, etc.)</p>	X		
<p>C. Was water present in the UST excavation, soil borings, or trenches? If yes, how far below land surface (indicate location and depth)?</p> <p>_____</p>		X	
<p>D. Did contaminated soils remain stockpiled on site after closure? If yes, indicate the stockpile location on the site map.</p> <p>Name of DHEC representative authorizing soil removal:</p> <p>_____</p>		X*	
<p>E. Was a petroleum sheen or free product detected on any excavation or boring waters?</p> <p>If yes, indicate location and thickness on the site map.</p>		N/A	

* All soil from the excavation was returned to the tank pit.

X. SAMPLING METHODOLOGY

Provide a detailed description of the methods used to collect and store (preserve) the samples.

After the removal of UST 38-1 soil samples were taken. Sampling was performed in accordance with SC DHEC R.61-92 Part 280 and SC DHEC UST Assessment Guidelines.

The samples are identified as follows:

	Detachment Charleston		General Engineering Labs
Soil Sample	UST38-1-1	=	SPORT -0337-1
Soil Sample	UST38-1-2	=	SPORT -0337-2
Soil Sample	UST38-1-3	=	SPORT -0337-3
Soil Sample	UST38-1-4	=	SPORT -0337-4
Soil Sample	UST38-1-5	=	SPORT -0337-5
VOA Trip Blank	UST38-1-6	=	SPORT -0337-6

Sample jars were prepared by the testing laboratory. The grab method was utilized to fill the sample containers leaving as little head space as possible and immediately capped. Soil samples were extracted at the tank ends. UST piping soil samples were taken under the piping at the mechanical connections. Biased composite samples were taken from the excavation dirt piles to characterize the soil for reuse or remediation.

The samples were marked, logged, and immediately placed in sample coolers packed with ice to maintain an approximate temperature of 4 C. Tools were thoroughly cleaned and decontaminated with organic-free soap and water after each sample.

The samples remained in the custody of SPORTENVDETCNASN until they were transferred to General Engineering Laboratories for analysis as documented in the attached Chain-of-Custody Record.

XI. RECEPTORS

Yes No

A.	Are there any lakes, ponds, streams, or wetlands located within 1000 feet of the UST system?	X	
	[Cooper R. ~ 193']		
	If yes, indicate type of receptor, distance, and direction on site map.		
B.	Are there any public, private, or irrigation water supply wells within 1000 feet of the UST system?		X
	If yes, indicate type of well, distance, and direction on site map.		
C.	Are there any underground structures (e.g., basements) located within 100 feet of the UST system?		X
	If yes, indicate the type of structure, distance, and direction on site map.		
D.	Are there any underground utilities (e.g., telephone, electricity, gas, water, sewer, storm drain) located within 100 feet of the UST system that could potentially come in contact with the contamination?	X	
	[storm drain, steam]		
	If yes, indicate the type of utility, distance, and direction on the site map.		
E.	Has contaminated soil been identified at a depth of less than 3 feet below land surface in an area that is not capped by asphalt or concrete?		X
	If yes, indicate the area of contaminated soil on the site map.		

SITE MAP

You must supply a scaled site map. It should include all buildings, road names, utilities, tank and pump island locations, sample locations, extent of excavation, and any other pertinent information.

Site Maps 1, 2, and 3

Photographs 1 and 2

ANALYTICAL RESULTS

You must submit the laboratory report and chain-of-custody form for the samples. These samples must be analyzed by a South Carolina certified laboratory.

Certified Analytical Results
Chain-of-Custody

Certificate of Disposal (tank)

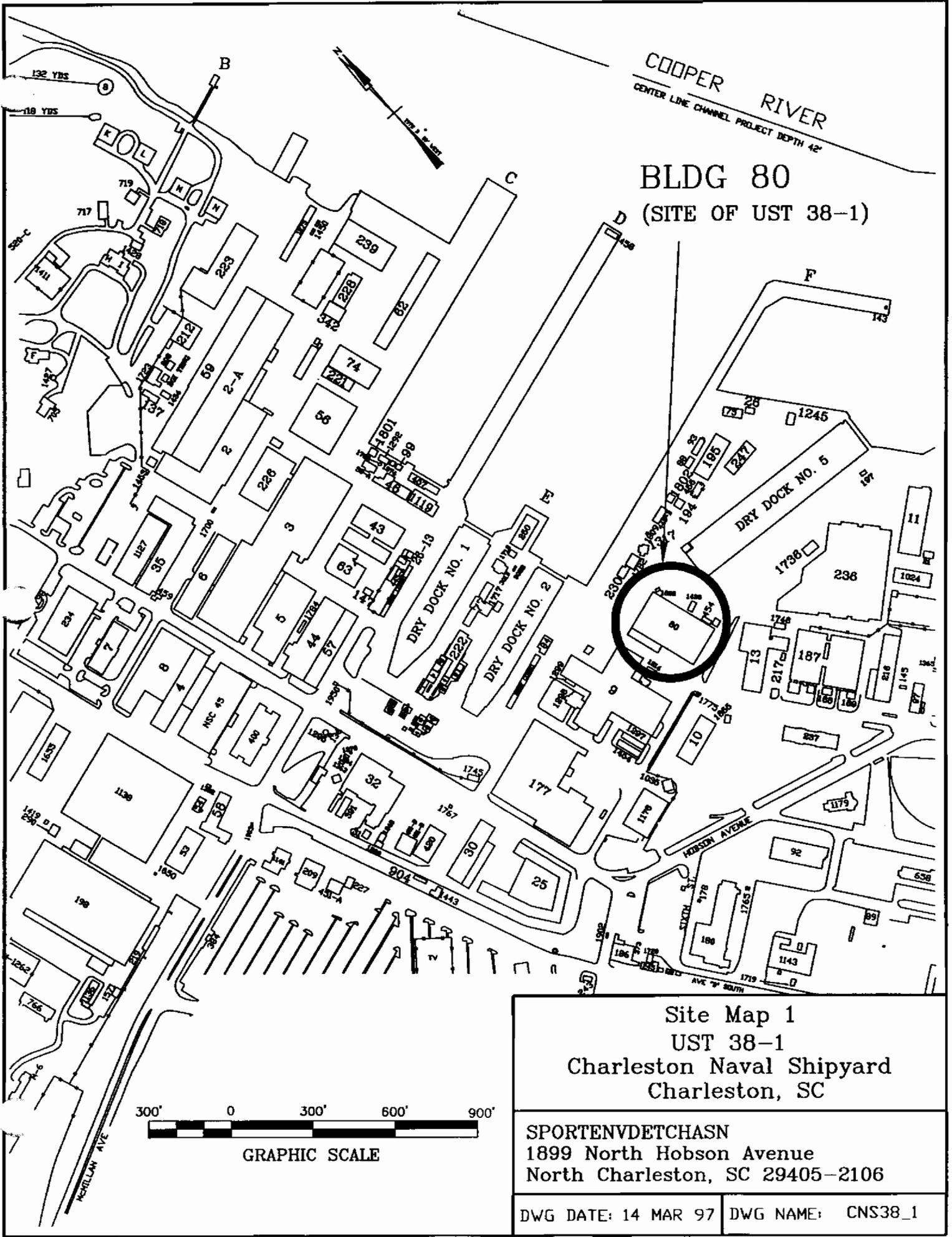
UST 38-1



Photo 1: UST 38-1 being removed. The holes were accidentally created during excavation and removal.

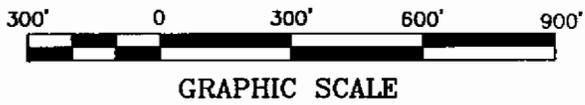


Photo 2: UST 38-1 excavation. Note permanently capped ventilation lines imbedded in the concrete slab.



COOPER RIVER
CENTER LINE CHANNEL PROJECT DEPTH 42'

BLDG 80
(SITE OF UST 38-1)



Site Map 1
UST 38-1
Charleston Naval Shipyard
Charleston, SC

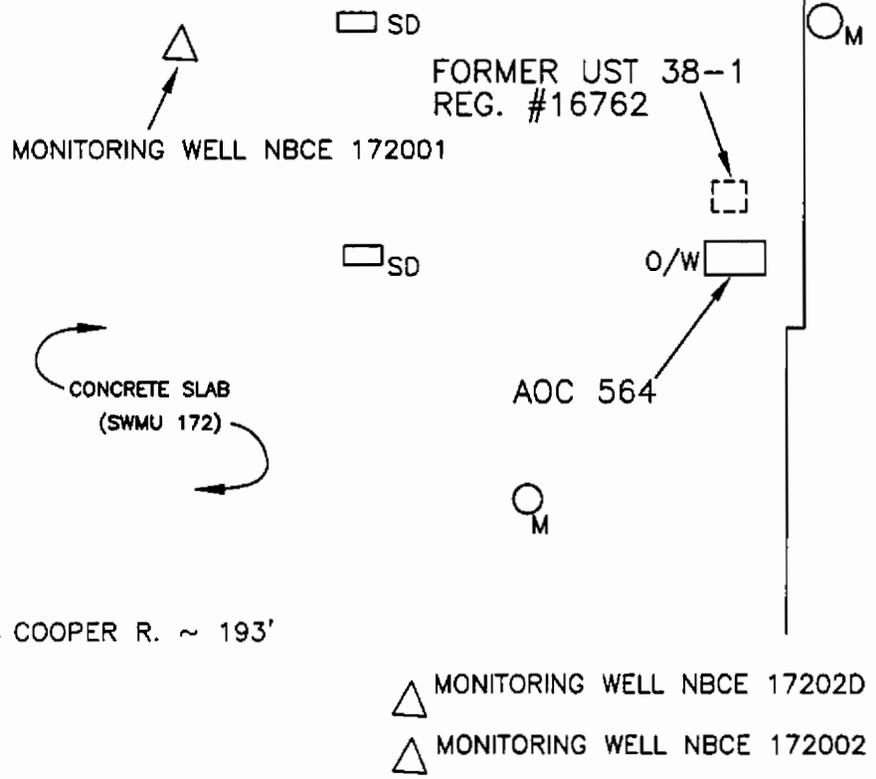
SPORTENVDETCNASN
1899 North Hobson Avenue
North Charleston, SC 29405-2106

DWG DATE: 14 MAR 97 DWG NAME: CNS38_1

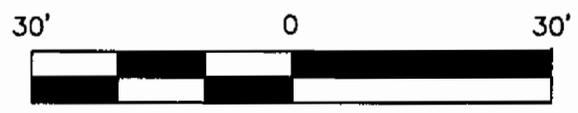
BUILDING 80

BLDG 9

AVENUE "A" SOUTH



- LEGEND
- M - MANHOLE
 - O/W - OILY WATER SEPARATOR
 - SD - STORM DRAIN
 - ST - STEAM LINE



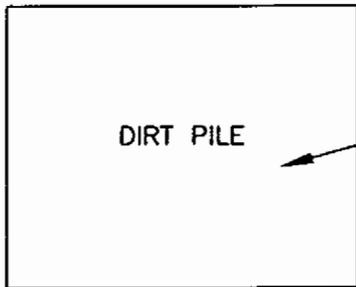
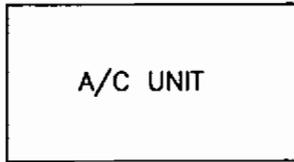
GRAPHIC SCALE

Site Map 2
UST 38-1
Charleston Naval Syd
Charleston, SC

SPORTENVDETHASN
1899 North Hobson Avenue
North Charleston, SC 29405-2106

DWG DATE: 31 MAR 97 DWG NAME: S38_2

BUILDING 80



SPORT 0337-1
SPORT 0337-2
(COMPOSITES)

FORMER UST 38-1
REG. #16762

SPORT 0337-4

PUMP OUT

GRAVITY FLOW
DRAIN

SPORT 0337-5

OILY WATER SEPARATOR
(AOC 564)

8" TERRA COTTA PIPING

VENT LINES, 2" STEEL
1 - UST
2 - O/W SEP.
RUN THROUGH CONCRETE

UST EXCAVATION

SPORT 0337-3

COOPER R. ~ 193'

NOTES:

- ⊙ ALL SAMPLES WERE SOIL SAMPLES
- ⊙ ALL SAMPLES WERE CHARACTERIZED AS MOIST BROWN SOIL, NO ODOR, OVA 0 ppm



GRAPHIC SCALE

Site Map 3
UST 38-1
Charleston Naval Shipyard
Charleston, SC

SPORTENVDETHASN
1899 North Hobson Avenue
North Charleston, SC 29405-2106

DWG DATE: 31 MAR 97 | DWG NAME: CNS38_3



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPA
FL	EX713647234	EA7472/87438
NC	303	
SC	18120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Einv.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

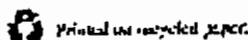
Page 1 of 3

Sample ID : SPORT0337-1
 Lab ID : 9702280-01
 Matrix : Soil
 Date Collected : 02/12/97
 Date Received : 02/13/97
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX - 4 items</i>											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	RMB	02/14/97	1054	97876	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	166	331	ug/kg	1.0	BDG	02/20/97	0010	97920	2
Acenaphthylene	U	0.00	166	331	ug/kg	1.0					
Anthracene	U	0.00	166	331	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	166	331	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	166	331	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	166	331	ug/kg	1.0					
Benzo(g,h,i)perylene	U	0.00	166	331	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	166	331	ug/kg	1.0					
Chrysene	U	0.00	166	331	ug/kg	1.0					
Dibenz(a,h)anthracene	U	0.00	166	331	ug/kg	1.0					
Fluoranthene	J	255	166	331	ug/kg	1.0					
Fluorene	U	0.00	166	331	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	166	331	ug/kg	1.0					
Naphthalene	U	0.00	166	331	ug/kg	1.0					
Phenanthrene	U	0.00	166	331	ug/kg	1.0					
Pyrene	U	0.00	166	331	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.173	0.00226	0.200	mg/kg	1.0	RMJ	02/18/97	1720	97928	N
Silver	U	14.1	41.1	970	ug/kg	2.0	NRM	02/20/97	1413	97893	3
Arsenic		4440	268	970	ug/kg	2.0					

PO Box 30712 - Charleston, SC 29417 • 2040 Savage Road - 29407

(803) 556-8171 - Fax (803) 766-1178



9702280-01*



GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EMI
FL	E87154/17294	237472/87431
NC	233	
SC	10120	18342
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Holston Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hines

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 2 of 3

Sample ID : SPORT0337-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyte	Date	Time	Batch	M
Barium		15700	24.0	970	ug/kg	2.0					
Cadmium	J	77.2	20.3	485	ug/kg	2.0	NRM	02/23/97	1413	97895	3
Chromium		64000	60.2	970	ug/kg	2.0					
Lead		18900	132	485	ug/kg	2.0					
Selenium	J	388	221	485	ug/kg	2.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		210	10.0	50.0	mg/kg	1.0	SLR	02/17/97	1400	97941	4

The following prep procedures were performed:

4S Base/Neutral Compounds

MCS 02/17/97 1400 97920 5

CRB 02/17/97 1845 97928 6

FGD 02/17/97 1800 97895 7

dry
TRACE

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	79.6	(30.0 - 115.)
Nitrobenzene-d5	M610	81.4	(23.0 - 120.)
p-Terphenyl-d14	M610	87.4	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	101.	(33.5 - 154.)
Dibromofluoromethane	BTEX-8260	114.	(63.4 - 136.)
Toluene-d8	BTEX-8260	114.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	101.	(33.5 - 154.)
Dibromofluoromethane	NAP-8260	114.	(63.4 - 136.)
Toluene-d8	NAP-8260	114.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260
M 2	EPA 8270
M 3	EPA 6010A
M 4	EPA 9071
M 5	EPA 3550

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9702280-01

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Laboratory Certifications

STATE	GEL	EPI
FL	EX7156/67294	EX7472/67418
NC	233	
SC	10130	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Eav.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 3 of 3

Sample ID : SPORT0337-1

M & Method	Method-Description
M 6	EPA 7471
M 7	EPA 3050

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

(indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7586.

Karen Blakeney
 Reviewed By

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(803) 556-8171 • Fax (803) 766-1178

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Laboratory Certification

FLA111	CEL	EPI
FL	EPI7156/87294	EPI7472/87451
NC	233	
IC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiatt

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 1 of 3

Sample ID : SPORT0337-2
 Lab ID : 9702280-02
 Matrix : Soil
 Date Collected : 02/12/97
 Date Received : 02/13/97
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	St
Volatile Organics											
<i>BTEX - 4 items</i>											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	RMB	02/14/97	1336	97876	1
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	J	1.30	1.00	2.00	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	166	332	ug/kg	1.0	BDC	02/20/97	0043	97920	2
Acenaphthylene	U	0.00	166	332	ug/kg	1.0					
Anthracene	U	0.00	166	332	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	166	332	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	166	332	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Benzo(g,h)perylene	U	0.00	166	332	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Chrysene	U	0.00	166	332	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	166	332	ug/kg	1.0					
Fluoranthene	U	0.00	166	332	ug/kg	1.0					
Fluorene	U	0.00	166	332	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	166	332	ug/kg	1.0					
Naphthalene	U	0.00	166	332	ug/kg	1.0					
Phenanthrene	U	0.00	166	332	ug/kg	1.0					
Pyrene	U	0.00	166	332	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.140	0.00246	0.200	mg/kg	1.0	RMI	02/18/97	1722	97928	N
Silver	U	15.3	42.4	1000	ug/kg	2.0	NRM	02/20/97	1419	97895	3
Arsenic		3040	276	1000	ug/kg	2.0					

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9702280-02



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Laboratory Certifications

STATE	QCL	EPA
FL	587136/1724	587472/17438
NC	233	
SC	10120	10512
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiern

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 2 of 3

Sample ID : SPORT0337-2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		20000	24.7	1000	ug/kg	2.0					
Calcium	J	92.6	20.9	500	ug/kg	2.0	NRM	02/20/97	1419	97895	3
Chromium		66300	62.1	1000	ug/kg	2.0					
Lead		28000	136	500	ug/kg	2.0					
Selenium	J	337	228	500	ug/kg	2.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		150	10.0	50.0	mg/kg	1.0	SLR	02/17/97	1400	97941	4

Following prep procedures were performed:
 GC/MS Base/Neutral Compounds
 Mercury
 TRACE

MCS	02/17/97	1400	97920	5
CIRB	02/17/97	1845	97928	6
FGD	02/17/97	1800	97895	7

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	78.5	(30.0 - 115.)
Nitrobenzene-d5	M610	76.7	(23.0 - 120.)
p-Terphenyl-d14	M610	82.3	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	104.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	103.	(63.4 - 136.)
Toluene-d8	BTEX-8260	112.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	104.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	103.	(63.4 - 136.)
Toluene-d8	NAP-8260	112.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260
M 2	EPA 8270
M 3	EPA 6010A
M 4	EPA 9071
M 5	EPA 3350

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Laboratory Certifications

STATE	GEL	RPY
FL	827156/87204	827472/87451
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWCD03196

Report Date: February 24, 1997

Page 3 of 3

Sample ID : SPORT0337-2

M & Method	Method-Description
M 6	EPA 7471
M 7	EPA 3050

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

I indicates that the analyte was not detected at a concentration greater than the detection limit.

Y indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
 Reviewed By

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STATE	DEL	EPT
FL	BE7156/87294	BE7472/87431
NC	230	
SC	10120	10512
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

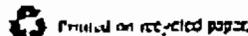
Page 1 of 3

Sample ID : SPORT0337-3
 Lab ID : 9702280-03
 Matrix : Soil
 Date Collected : 02/12/97
 Date Received : 02/13/97
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX - 4 items</i>											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	RMB	02/14/97	1407	97876	1
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes	U	0.00	1.00	2.00	ug/kg	1.0					
BTEX (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	165	330	ug/kg	1.0	BDG	02/18/97	1834	97920	2
Acenaphthylene	U	0.00	165	330	ug/kg	1.0					
Anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	165	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	165	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Chrysene	U	0.00	165	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	165	330	ug/kg	1.0					
Fluoranthene	J	329	165	330	ug/kg	1.0					
Fluorene	U	0.00	165	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	165	330	ug/kg	1.0					
Naphthalene	U	0.00	165	330	ug/kg	1.0					
Phenanthrene	U	0.00	165	330	ug/kg	1.0					
Pyrene	J	171	165	330	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.142	0.00240	0.200	mg/kg	1.0	RMI	02/18/97	1725	97928	N
Silver	U	15.7	39.3	926	ug/kg	2.0	MRM	02/20/97	1424	97895	3
Cadmium		2380	255	926	ug/kg	2.0					

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Laboratory Certifications

STATE	GEL	EPA
FL	287154/87294	287472/87458
NC	231	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Flinn

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 2 of 3

Sample ID : SPORT0337-3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		17700	22.9	926	ug/kg	2.0					
Cadmium	J	22.6	19.4	463	ug/kg	2.0	NRM	02/20/97	1424	97895	3
Chromium		40900	57.5	926	ug/kg	2.0					
Lead		33600	126	463	ug/kg	2.0					
Selenium	J	346	211	463	ug/kg	2.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		120	10.0	50.0	mg/kg	1.0	SLR	02/17/97	1400	97941	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds

Mercury

TRACE

MCS 02/17/97 1400 97920 5

CRB 02/17/97 1845 97928 6

FDD 02/17/97 1800 97895 7

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	79.0	(30.0 - 115.)
Nitrobenzene-d5	M610	76.4	(23.0 - 120.)
p-Terphenyl-d14	M610	87.3	(17.3 - 128.)
Bromofluorobenzene	BTEX-8260	110.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	109.	(63.4 - 136.)
Toluene-d8	BTEX-8260	117.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	110.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	109.	(63.4 - 136.)
Toluene-d8	NAP-8260	117.	(72.1 - 137.)

M = Method	Method-Description
M1	EPA 8260
M2	EPA 8270
M3	EPA 6010A
M4	EPA 9071
M5	EPA 3550

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Laboratory Certifications

STATE	GEL	CFI
FL	ES715687294	ES7472/87431
NC	233	
SC	10120	10512
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 3 of 3

Sample ID : SPORT0337-3

M = Method	Method-Description
M 6	EPA 7471
M 7	EPA 3050

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
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Laboratory Certifications

STATE	GR.	EPI
FL	ET154/17294	ET147/17438
NC	235	
SC	10120	10182
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiatt

Project Description: SUPSHIP-Portsmouth Detachment

CC: NFWC00196

Report Date: February 24, 1997

Page 1 of 1

Sample ID : SPORT0337-4
 Lab ID : 9702280-04
 Matrix : Soil
 Date Collected : 02/12/97
 Date Received : 02/13/97
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX - 4 items</i>											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	RMB	02/17/97	1042	97876	1
toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
<i>Poly-nuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	164	330	ug/kg	1.0	BDO	02/20/97	0115	97920	2
Acenaphthylene	U	0.00	164	330	ug/kg	1.0					
Anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	164	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Benzo(g,h,i)perylene	U	0.00	164	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Chrysene	U	0.00	164	330	ug/kg	1.0					
Dibenz(a,h)anthracene	U	0.00	164	330	ug/kg	1.0					
Fluoranthene		358	164	330	ug/kg	1.0					
Fluorene	U	0.00	164	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	164	330	ug/kg	1.0					
Naphthalene	U	0.00	164	330	ug/kg	1.0					
Phenanthrene	U	0.00	164	330	ug/kg	1.0					
Pyrene	J	203	164	330	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.106	0.00231	0.200	mg/kg	1.0	RMJ	02/18/97	1727	97920	N
Silver	U	40.7	41.6	980	ug/kg	2.0	NRM	02/20/97	1430	97895	3
Ariscnic		3460	270	980	ug/kg	2.0					

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STATE	GEL	EPI
FL	EFT15017294	EFT17217451
NC	233	
SC	10120	10512
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 2 of 3

Sample ID : SPORT0337-4

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		17600	242	980	ng/kg	2.0					
Cadmium	J	149	20.5	490	ug/kg	2.0	NRM	02/20/97	1430	97895	3
Chromium		109000	60.9	980	ug/kg	2.0					
Lead		19600	134	490	ug/kg	2.0					
Selenium	J	371	223	490	ug/kg	2.0					
General Chemistry											
Total Rec. Para. Hydrocarbons		170	10.0	50.0	mg/kg	1.0	SLR	02/17/97	1400	97941	4

The following prep procedures were performed:

GC/MS Base/Neutral Compounds

Mercury

TRACE

MCS 02/17/97 1400 97920 5

CRB 02/17/97 1845 97928 6

FGD 02/17/97 1800 97895 7

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	92.0	(30.0 - 115.)
Nitrobenzene-d5	M610	91.4	(23.0 - 120.)
p-Terphenyl-d14	M610	101.	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	108.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	120.	(63.4 - 136.)
Toluene-d8	BTEX-8260	120.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	108.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	120.	(63.4 - 136.)
Toluene-d8	NAP-8260	120.	(72.1 - 137.)

M = Method	Method-Description
M1	EPA 8260
M2	EPA 8270
M3	EPA 6010A
M4	EPA 9071
	EPA 3550

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Laboratory Certifications

STATE	GEL	EPA
FL	217136/17294	217472/17458
NC	233	
SC	10130	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 3 of 3

Sample ID : SPORT0337-4

M = Method	Method-Description
M 6	EPA 7471
M 7	EPA 3050

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

indicates that the analyte was not detected at a concentration greater than the detection limit.

indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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Laboratory Certification

STATE	021	291
FL	21756/87294	21747/87411
NC	223	
SC	16120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Err.
 1899 North Holston Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

no: NPW000196

Report Date: February 24, 1997

Page 1 of 3

Sample ID : SPORT0337-5
 Lab ID : 9702280-05
 Matrix : Soil
 Date Collected : 02/12/97
 Date Received : 02/13/97
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>BTEX - 4 items</i>											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	RMB	02/14/97	15:11	97876	1
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylene	U	0.00	1.00	2.00	ug/kg	1.0					
Sum (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	164	330	ug/kg	1.0	BDG	02/20/97	0147	97920	2
Acenaphthylene	U	0.00	164	330	ug/kg	1.0					
Anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	164	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	164	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Chrysene	U	0.00	164	330	ug/kg	1.0					
Dibenz(a,h)anthracene	U	0.00	164	330	ug/kg	1.0					
Fluoranthene	U	0.00	164	330	ug/kg	1.0					
Fluorene	U	0.00	164	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	164	330	ug/kg	1.0					
Naphthalene	U	0.00	164	330	ug/kg	1.0					
Phenanthrene	U	0.00	164	330	ug/kg	1.0					
Pyrene	U	0.00	164	330	ug/kg	1.0					
Metals Analysis											
Mercury	J	0.0857	0.00238	0.200	mg/kg	1.0	RMJ	02/18/97	1729	97928	N
Silver	U	-6.52	41.1	970	ug/kg	2.0	NRM	02/20/97	1437	97895	3
Vanadium		2800	268	970	ug/kg	2.0					

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STATE	CEL	EPI
FL	BB715647294	EE747287458
NC	233	
SC	10120	10382
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 2 of 3

Sample ID : SPOR70337-5

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Barium		5300	24.0	970	ug/kg	2.0					
Cadmium	J	73.4	20.3	485	ug/kg	2.0	NRM	02/20/97	1437	97895	3
Chromium		85600	60.2	970	ug/kg	2.0					
Lead		19000	132	485	ug/kg	2.0					
Selenium	J	372	221	485	ug/kg	2.0					
General Chemistry											
Total Rec. Petro. Hydrocarbons		90.0	10.0	50.0	mg/kg	1.0	SLR	02/17/97	1400	97941	4

The following prep procedures were performed:

M5 Base/Neutral Compounds

MCS 02/17/97 1400 97920 5

CRB 02/17/97 1845 97928 6

FGD 02/17/97 1800 97895 7

Trace

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	83.4	(30.0 - 115.)
Nitrobenzene-d5	M610	84.0	(23.0 - 120.)
p-Terphenyl-d14	M610	105.	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	107.	(53.5 - 154.)
Dibromofluoromethane	BTEX-8260	110.	(63.4 - 136.)
Toluene-d8	BTEX-8260	124.	(72.1 - 137.)
Bromofluorobenzene	NAP-8260	107.	(53.5 - 154.)
Dibromofluoromethane	NAP-8260	110.	(63.4 - 136.)
Toluene-d8	NAP-8260	124.	(72.1 - 137.)

M = Method	Method-Description
M1	EPA 8260
M2	EPA 8270
M3	EPA 6010A
M4	EPA 9071
M5	EPA 3550

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FL	267136/17294	267472/17434
NC	231	
SC	10720	10542
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

NPWC00196

Report Date: February 24, 1997

Page 3 of 3

Sample ID : SPORT0337-5

M = Method	Method-Description
M 6	EPA 7471
M 7	EPA 3050

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

Q indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
 Reviewed By

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NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Eav.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: February 24, 1997

Page 2 of 2

Sample ID : SPORT0337-6

M = Method Method-Description

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analytic recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
 Reviewed By

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9702280-06*



CHAIN OF CUSTODY RECORD

9703280

P.O. Box 30712
 Charleston, South Carolina 29417
 (803) 556-8171

Client Name/Facility Name		SAMPLE ANALYSIS REQUIREMENTS (a) - use remarks area to specify specific compounds or methods														Remarks				
SPORTEN DETCHASN		pH	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method required	METHALS - specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	TPH		Cellulose - specify type	CYBER PLUS	MPTA/EN	PAH
Collected by/Company	SPORTEN DETCHASN																			
SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# OF CONTAINERS													
01 SPORTΦ337-1	2/12/97	1415	X	X			4								X		X	X	UST 38-1-1 DIRT PILE	
02 SPORTΦ337-2	2/12/97	1415	X	X			4								X		X	X	UST 38-1-2 DIRT PILE SPLIT	
03 SPORTΦ337-3	2/12/97	1430	X		X		4								X		X	X	UST 38-1-3 Soil	
04 SPORTΦ337-4	2/12/97	1440	X		X		4								X		X	X	UST 38-1-4 Soil	
05 SPORTΦ337-5	2/12/97	1450	X		X		4								X		X	X	UST 38-1-5 Soil	
06 SPORTΦ337-6	2/12/97	1345	X		X		1										X		UST 38-1 VOA Soil TRIP BLANK	

← The I or P in the boxes indicate whether sample was filtered and/or preserved
 CCL 25604

Relinquished by: *[Signature]* Date: 2/11/97 Time: 0815 Received by: *W. R. Hiers, Jr.* Relinquished by: *W. R. Hiers, Jr.* Date: 2/13/97 Time: 1432 Received by: *Lee P. Moore*

Relinquished by: *Lee P. Moore* Date: 2/13/97 Time: 14:50 Received by lab by: *Karen Blakely* Date: 2/13/97 Time: 14:50 Remarks:

White = sample collector Yellow = file Pink = with report

2-21



December 5, 1997

2600 Bull Street
Columbia, SC 29201-1708

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Mr. Gabriel L. Magwood
Southern Division NFEC

BOARD:
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P.O. Box 190010
2155 Eagle Drive

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Vice Chairman

North Charleston, South Carolina 29419-9010

Roger Leaks, Jr.
Secretary

Re: Response to Comments dated October 29, 1997
Bldg. 80 (tank 38-1) (Site Identification # 16762)
Charleston Naval Complex/Charleston Naval Base
Charleston, SC
Charleston County

Mark B. Kent

Cyndi C. Mosteller

Brian K. Smith

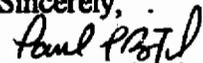
Rodney L. Grandy

Dear Mr. Magwood:

The author has completed technical review of the referenced document. Based on the information provided, the author concurs with the proposal to defer additional assessments under the Tank Management Plan pending the outcome of the RCRA Facility Investigation (RFI) for AOC 564.

Should you have any questions, please contact me at (803) 734-5328.

Sincerely,


Paul L. Bristol, Hydrogeologist
Groundwater Quality Section
Bureau of Water

cc: Trident District EQC



2600 Bull Street
Columbia, SC 29201-1708

Mr. Gabriel L. Magwood
Southern Division NFEC
P.O. Box 190010
2155 Eagle Drive
North Charleston, South Carolina 29419-9010

Re: Underground Storage Tank Assessment Report dated May 9, 1997
 Bldg. 80 (tank 38-1) (Site Identification # 16762)
 Charleston Naval Complex/Charleston Naval Base
 Charleston, SC
 Charleston County

Date: October 28, 1997

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the report provides a narrative describing closure activities and analytical results of environmental sampling conducted to determine if releases have occurred from operation of the referenced underground storage tank and/or associated piping system. The results presented indicate elevated levels of total RCRA metals were detected in soils grab samples obtained from the tank pit excavation. These results appear to necessitate additional endeavors for remedial actions and characterization of site soils for proper disposal, as appropriate. It is recognized that UST 38-1 has been designated as AOC #564 and additional additional site assessment/corrective action activities may be incorporated with future RFI (RCRA Facility Investigations) work for AOC #564. Please submit written notification to the author describing the facility's intended course of action at this site by December 1, 1997.

Should you have any questions, please contact me at (803) 734-5328.

Sincerely,

A handwritten signature in black ink that reads 'Paul L. Bristol'.

Paul L. Bristol, Hydrogeologist
Groundwater Quality Section
Bureau of Water

cc: Trident District EQC

Analytical Data Summary

01/13/2003 2:45 PM

StationID	E172GW001
SampleID	172GW001M1
DateCollected	1/18/2002
DateExtracted	1/29/2002
DateAnalyzed	1/29/2002
SDGNumber	54860W

Parameter	Units		
1,1,1-Trichloroethane	ug/L	5	U
1,1,2,2-Tetrachloroethane	ug/L	5	U
1,1,2-Trichloroethane	ug/L	5	U
1,1-Dichloroethane	ug/L	5	U
1,1-Dichloroethene	ug/L	5	U
1,2,3-Trichlorobenzene	ug/L	5	U
1,2-Dichloroethane	ug/L	5	U
1,2-Dichloroethene (total)	ug/L	1.1	J
1,2-Dichloropropane	ug/L	5	U
2-Chloroethyl vinyl ether	ug/L	5	UJ
2-Hexanone	ug/L	10	U
Acetone	ug/L	10	U
Benzene	ug/L	0.37	J
Bromodichloromethane	ug/L	5	U
Bromoform	ug/L	5	U
Bromomethane	ug/L	10	U
Carbon Disulfide	ug/L	5	U
Carbon Tetrachloride	ug/L	5	U
Chlorobenzene	ug/L	12.7	=
Chloroethane	ug/L	10	U
Chloroform	ug/L	5	U
Chloromethane	ug/L	10	U
cis-1,2-Dichloroethylene	ug/L	1.1	J
cis-1,3-Dichloropropene	ug/L	5	U
Dibromochloromethane	ug/L	5	U
Ethylbenzene	ug/L	5	U
m+p Xylene	ug/L	5	U
Methyl ethyl ketone (2-Butanone)	ug/L	10	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/L	10	U
Methylene Chloride	ug/L	5	U

Analytical Data Summary

01/13/2003 2:45 PM

StationID	E172GW001
SampleID	172GW001M1
DateCollected	1/18/2002
DateExtracted	1/29/2002
DateAnalyzed	1/29/2002
SDGNumber	54860W

Parameter	Units		
o-Xylene	ug/L	5	U
Styrene	ug/L	5	U
Tetrachloroethylene (PCE)	ug/L	5	U
Toluene	ug/L	0.21	J
trans-1,2-Dichloroethene	ug/L	5	U
trans-1,3-Dichloropropene	ug/L	5	U
Trichloroethylene (TCE)	ug/L	5	U
Vinyl acetate	ug/L	10	UJ
Vinyl chloride	ug/L	2.3	J
Xylenes, Total	ug/L	5	U
1,3-Dichlorobenzene	ug/L	1.4	J
1,4-Dichlorobenzene	ug/L	4.3	J
1,2-Dichlorobenzene	ug/L	5.9	=
1,2,4--Trichlorobenzene	ug/L	5	U

Analytical Data Summary

01/13/2003 2:45 PM

Parameter	Units	E172SB011		E172SB011		E172SB012	
		7.8	U	5.6	U	7.2	U
1,1,1-Trichloroethane	ug/kg	7.8	U	5.6	U	7.2	U
1,1,1,2-Tetrachloroethane	ug/kg	7.8	U	5.6	U	7.2	U
1,1,2-Trichloroethane	ug/kg	7.8	U	5.6	U	7.2	U
1,1-Dichloroethane	ug/kg	7.8	U	5.6	U	7.2	U
1,1-Dichloroethene	ug/kg	7.8	U	5.6	U	7.2	U
1,2,3-Trichlorobenzene	ug/kg	7.8	U	5.6	U	7.2	U
1,2-Dichloroethane	ug/kg	7.8	U	5.6	U	7.2	U
1,2-Dichloroethene (total)	ug/kg	7.8	U	5.6	U	7.2	U
1,2-Dichloropropane	ug/kg	7.8	U	5.6	U	7.2	U
2-Chloroethyl vinyl ether	ug/kg	15.6	U	11.1	U	14.4	U
2-Hexanone	ug/kg	15.6	U	11.1	U	14.4	U
Acetone	ug/kg	232	=	11.3	=	18.9	=
Benzene	ug/kg	7.8	U	5.6	U	7.2	U
Bromodichloromethane	ug/kg	7.8	U	5.6	U	7.2	U
Bromoform	ug/kg	7.8	U	5.6	U	7.2	U
Bromomethane	ug/kg	15.6	U	11.1	U	14.4	U
Carbon Disulfide	ug/kg	7.8	U	5.6	U	7.2	U
Carbon Tetrachloride	ug/kg	7.8	U	5.6	U	7.2	U
Chlorobenzene	ug/kg	7.8	U	5.6	U	7.2	U
Chloroethane	ug/kg	15.6	U	11.1	U	14.4	U
Chloroform	ug/kg	7.8	U	5.6	U	7.2	U
Chloromethane	ug/kg	15.6	U	11.1	U	14.4	U
cis-1,2-Dichloroethylene	ug/kg	7.8	U	5.6	U	7.2	U
cis-1,3-Dichloropropene	ug/kg	7.8	U	5.6	U	7.2	U
Dibromochloromethane	ug/kg	7.8	U	5.6	U	7.2	U
Ethylbenzene	ug/kg	7.8	U	5.6	U	7.2	U
m+p Xylene	ug/kg	7.8	U	5.6	U	7.2	U
Methyl ethyl ketone (2-Butanone)	ug/kg	10.9	J	11.1	U	14.4	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	7.8	U	5.6	U	7.2	U
Methylene Chloride	ug/kg	1.6	J	5.6	U	3.6	J

Analytical Data Summary

01/13/2003 2:45 PM

StationID	E172SB012		E172SB013		E172SB013		
SampleID	172SB01202 (3-5ft)		172SB01301 (0-1ft)		172SB01302 (3-5ft)		
DateCollected			1/18/2002				
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	55050		54860		54860		
Parameter	Units						
1,1,1-Trichloroethane	ug/kg	6.3	U	6.8	U	6.3	U
1,1,2,2-Tetrachloroethane	ug/kg	6.3	U	6.8	U	6.3	U
1,1,2-Trichloroethane	ug/kg	6.3	U	6.8	U	6.3	U
1,1-Dichloroethane	ug/kg	6.3	U	6.8	U	6.3	U
1,1-Dichloroethene	ug/kg	6.3	U	6.8	U	6.3	U
1,2,3-Trichlorobenzene	ug/kg	6.3	U	6.8	U	6.3	U
1,2-Dichloroethane	ug/kg	6.3	U	6.8	U	6.3	U
1,2-Dichloroethene (total)	ug/kg	6.3	U	6.8	U	6.3	U
1,2-Dichloropropane	ug/kg	6.3	U	6.8	U	6.3	U
2-Chloroethyl vinyl ether	ug/kg	12.6	U	13.6	U	12.6	U
2-Hexanone	ug/kg	12.6	U	13.6	U	12.6	U
Acetone	ug/kg	32.4	=	42.4	=	1310	U
Benzene	ug/kg	6.3	U	6.8	U	6.3	U
Bromodichloromethane	ug/kg	6.3	U	6.8	U	6.3	U
Bromoform	ug/kg	6.3	U	6.8	U	6.3	U
Bromomethane	ug/kg	12.6	U	13.6	U	12.6	U
Carbon Disulfide	ug/kg	2.1	J	6.8	U	6.3	U
Carbon Tetrachloride	ug/kg	6.3	U	6.8	U	6.3	U
Chlorobenzene	ug/kg	6.3	U	6.8	U	6.3	U
Chloroethane	ug/kg	12.6	U	13.6	U	12.6	U
Chloroform	ug/kg	6.3	U	6.8	U	6.3	U
Chloromethane	ug/kg	12.6	U	13.6	U	12.6	U
cis-1,2-Dichloroethylene	ug/kg	6.3	U	6.8	U	6.3	U
cis-1,3-Dichloropropene	ug/kg	6.3	U	6.8	U	6.3	U
Dibromochloromethane	ug/kg	6.3	U	6.8	U	6.3	U
Ethylbenzene	ug/kg	6.3	U	6.8	U	6.3	U
m+p Xylene	ug/kg	6.3	U	6.8	U	6.3	U
Methyl ethyl ketone (2-Butanone)	ug/kg	12.6	U	5.3	J	12.6	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	6.3	U	6.8	U	6.3	U
Methylene Chloride	ug/kg	2.7	J	2.8	J	2.4	J

Analytical Data Summary

01/13/2003 2:45 PM

StationID	E172SB014		E172SB014		E172SB015		
SampleID	172SB01401 (0-1ft)		172SB01402 (3-5ft)		172SB01501 (0-1ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/30/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
1,1,1-Trichloroethane	ug/kg	6.8	U	5.2	U	4.5	U
1,1,2,2-Tetrachloroethane	ug/kg	6.8	U	5.2	U	4.5	U
1,1,2-Trichloroethane	ug/kg	6.8	U	5.2	U	4.5	U
1,1-Dichloroethane	ug/kg	6.8	U	5.2	U	19.8	=
1,1-Dichloroethene	ug/kg	6.8	U	5.2	U	4.5	U
1,2,3-Trichlorobenzene	ug/kg	6.8	U	5.2	UJ	4.5	U
1,2-Dichloroethane	ug/kg	6.8	U	5.2	U	4.5	U
1,2-Dichloroethene (total)	ug/kg	6.8	U	5.2	U	22	=
1,2-Dichloropropane	ug/kg	6.8	U	5.2	U	4.5	U
2-Chloroethyl vinyl ether	ug/kg	13.7	UJ	10.4	U	9.1	U
2-Hexanone	ug/kg	13.7	U	10.4	U	9.1	U
Acetone	ug/kg	105	=	83.8	=	71.6	=
Benzene	ug/kg	6.8	U	5.2	U	4.5	U
Bromodichloromethane	ug/kg	6.8	U	5.2	U	4.5	U
Bromoform	ug/kg	6.8	U	5.2	U	4.5	U
Bromomethane	ug/kg	13.7	U	10.4	U	9.1	U
Carbon Disulfide	ug/kg	6.8	U	5.2	U	4.5	U
Carbon Tetrachloride	ug/kg	6.8	U	5.2	U	4.5	U
Chlorobenzene	ug/kg	6.8	U	5.2	U	1.3	J
Chloroethane	ug/kg	13.7	U	10.4	U	9.1	U
Chloroform	ug/kg	6.8	U	5.2	U	4.5	U
Chloromethane	ug/kg	13.7	U	10.4	U	9.1	U
cis-1,2-Dichloroethylene	ug/kg	6.8	U	5.2	U	22	=
cis-1,3-Dichloropropene	ug/kg	6.8	U	5.2	U	4.5	U
Dibromochloromethane	ug/kg	6.8	U	5.2	U	4.5	U
Ethylbenzene	ug/kg	6.8	U	5.2	U	4.5	U
m+p Xylene	ug/kg	6.8	U	5.2	U	1.7	J
Methyl ethyl ketone (2-Butanone)	ug/kg	13.7	U	10.4	U	3.8	J
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	6.8	U	5.2	U	4.5	U
Methylene Chloride	ug/kg	0.85	J	2.3	J	3.1	J

Analytical Data Summary

01/13/2003 2:45 PM

StationID	E172SB015		E172SB016		E172SB016		
SampleID	172SB01502 (3-5ft)		172SB01601 (0-1ft)		172SB01602 (3-5ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
1,1,1-Trichloroethane	ug/kg	472	U	5.6	U	4.5	U
1,1,2,2-Tetrachloroethane	ug/kg	472	U	5.6	U	4.5	U
1,1,2-Trichloroethane	ug/kg	472	U	5.6	U	4.5	U
1,1-Dichloroethane	ug/kg	106	J	15.2	=	13	=
1,1-Dichloroethene	ug/kg	472	U	5.6	U	4.5	U
1,2,3-Trichlorobenzene	ug/kg	472	U	5.6	U	4.5	U
1,2-Dichloroethane	ug/kg	472	U	5.6	U	4.5	U
1,2-Dichloroethene (total)	ug/kg	190	J	23	=	17	=
1,2-Dichloropropane	ug/kg	472	U	5.6	U	4.5	U
2-Chloroethyl vinyl ether	ug/kg	943	U	11.1	U	9.1	U
2-Hexanone	ug/kg	943	U	11.1	U	9.1	U
Acetone	ug/kg	619	J	736	J	138	=
Benzene	ug/kg	472	U	5.6	U	4.5	U
Bromodichloromethane	ug/kg	472	U	5.6	U	4.5	U
Bromoform	ug/kg	472	U	5.6	U	4.5	U
Bromomethane	ug/kg	943	U	11.1	U	9.1	U
Carbon Disulfide	ug/kg	472	U	5.6	U	4.5	U
Carbon Tetrachloride	ug/kg	472	U	5.6	U	4.5	U
Chlorobenzene	ug/kg	310	J	5.6	U	3.7	J
Chloroethane	ug/kg	943	U	11.1	U	9.1	U
Chloroform	ug/kg	472	U	5.6	U	4.5	U
Chloromethane	ug/kg	943	U	11.1	U	9.1	U
cis-1,2-Dichloroethylene	ug/kg	190	J	23	=	17	=
cis-1,3-Dichloropropene	ug/kg	472	U	5.6	U	4.5	U
Dibromochloromethane	ug/kg	472	U	5.6	U	4.5	U
Ethylbenzene	ug/kg	472	U	0.72	J	0.28	J
m+p Xylene	ug/kg	472	U	1.9	J	0.86	J
Methyl ethyl ketone (2-Butanone)	ug/kg	943	U	11	J	7.6	J
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	472	U	5.6	U	4.5	U
Methylene Chloride	ug/kg	472	U	2.5	J	2.2	J

Analytical Data Summary

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StationID	E172SB017		E172SB017		E172SB018		
SampleID	172SB01701 (0-1ft)		172SB01702 (3-5ft)		172SB01801 (0-1ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
1,1,1-Trichloroethane	ug/kg	4.6	U	4.1	U	4.3	U
1,1,2,2-Tetrachloroethane	ug/kg	4.6	U	4.1	U	4.3	U
1,1,2-Trichloroethane	ug/kg	4.6	U	4.1	U	4.3	U
1,1-Dichloroethane	ug/kg	4.6	U	4.1	U	2.8	J
1,1-Dichloroethene	ug/kg	4.6	U	4.1	U	4.3	U
1,2,3-Trichlorobenzene	ug/kg	4.6	U	4.1	U	4.3	U
1,2-Dichloroethane	ug/kg	4.6	U	4.1	U	4.3	U
1,2-Dichloroethene (total)	ug/kg	4.6	U	4.1	U	5.3	=
1,2-Dichloropropane	ug/kg	4.6	U	4.1	U	4.3	U
2-Chloroethyl vinyl ether	ug/kg	9.2	U	8.2	U	8.6	U
2-Hexanone	ug/kg	9.2	U	8.2	U	8.6	U
Acetone	ug/kg	18.6	=	34.9	=	304	=
Benzene	ug/kg	4.6	U	4.1	U	4.3	U
Bromodichloromethane	ug/kg	4.6	U	4.1	U	4.3	U
Bromoform	ug/kg	4.6	U	4.1	U	4.3	U
Bromomethane	ug/kg	9.2	U	8.2	U	8.6	U
Carbon Disulfide	ug/kg	4.6	U	4.1	U	4.3	U
Carbon Tetrachloride	ug/kg	4.6	U	4.1	U	4.3	U
Chlorobenzene	ug/kg	4.6	U	4.1	U	4.3	U
Chloroethane	ug/kg	9.2	U	8.2	U	8.6	U
Chloroform	ug/kg	4.6	U	4.1	U	4.3	U
Chloromethane	ug/kg	9.2	U	8.2	U	8.6	U
cis-1,2-Dichloroethylene	ug/kg	4.6	U	4.1	U	5.3	=
cis-1,3-Dichloropropene	ug/kg	4.6	U	4.1	U	4.3	U
Dibromochloromethane	ug/kg	4.6	U	4.1	U	4.3	U
Ethylbenzene	ug/kg	4.6	U	4.1	U	4.3	U
m+p Xylene	ug/kg	4.6	U	4.1	U	4.3	U
Methyl ethyl ketone (2-Butanone)	ug/kg	9.2	U	8.2	U	8.6	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	4.6	U	4.1	U	4.3	U
Methylene Chloride	ug/kg	1.6	J	1.7	J	1.4	J

Analytical Data Summary

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StationID	E172SB018		E172SB019		E172SB019		
SampleID	172SB01802 (3-5ft)		172SB01901 (0-1ft)		172SB01902 (3-5ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
1,1,1-Trichloroethane	ug/kg	4.3	U	5.3	U	4.5	U
1,1,2,2-Tetrachloroethane	ug/kg	4.3	U	5.3	U	4.5	U
1,1,2-Trichloroethane	ug/kg	4.3	U	5.3	U	4.5	U
1,1-Dichloroethane	ug/kg	1.3	J	5.3	U	4.5	U
1,1-Dichloroethene	ug/kg	4.3	U	5.3	U	4.5	U
1,2,3-Trichlorobenzene	ug/kg	4.3	U	5.3	U	4.5	U
1,2-Dichloroethane	ug/kg	4.3	U	5.3	U	4.5	U
1,2-Dichloroethene (total)	ug/kg	1	J	0.46	J	4.5	U
1,2-Dichloropropane	ug/kg	4.3	U	5.3	U	4.5	U
2-Chloroethyl vinyl ether	ug/kg	8.6	U	10.6	U	8.9	U
2-Hexanone	ug/kg	8.6	U	10.6	U	8.9	U
Acetone	ug/kg	38.3	=	15.3	=	8.9	U
Benzene	ug/kg	4.3	U	5.3	U	4.5	U
Bromodichloromethane	ug/kg	4.3	U	5.3	U	4.5	U
Bromoform	ug/kg	4.3	U	5.3	U	4.5	U
Bromomethane	ug/kg	8.6	U	10.6	U	8.9	U
Carbon Disulfide	ug/kg	4.3	U	5.3	U	4.5	U
Carbon Tetrachloride	ug/kg	4.3	U	5.3	U	4.5	U
Chlorobenzene	ug/kg	4.3	U	5.3	U	4.5	U
Chloroethane	ug/kg	8.6	U	10.6	U	8.9	U
Chloroform	ug/kg	4.3	U	5.3	U	4.5	U
Chloromethane	ug/kg	8.6	U	10.6	U	8.9	U
cis-1,2-Dichloroethylene	ug/kg	1	J	0.46	J	4.5	U
cis-1,3-Dichloropropene	ug/kg	4.3	U	5.3	U	4.5	U
Dibromochloromethane	ug/kg	4.3	U	5.3	U	4.5	U
Ethylbenzene	ug/kg	4.3	U	5.3	U	4.5	U
m+p Xylene	ug/kg	4.3	U	5.3	U	4.5	U
Methyl ethyl ketone (2-Butanone)	ug/kg	8.6	U	10.6	U	8.9	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	4.3	U	5.3	U	4.5	U
Methylene Chloride	ug/kg	1.6	J	2.2	J	1.6	J

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StationID	E172SB011		E172SB011		E172SB012		
SampleID	172SB01101 (0-1ft)		172SB01102 (3-5ft)		172SB01201 (0-1ft)		
DateCollected	1/18/2002				1/23/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		55050		
Parameter	Units						
o-Xylene	ug/kg	7.8	U	5.6	U	7.2	U
Styrene	ug/kg	7.8	U	5.6	U	7.2	U
Tetrachloroethylene (PCE)	ug/kg	7.8	U	5.6	U	7.2	U
Toluene	ug/kg	0.59	J	0.34	J	7.2	U
trans-1,2-Dichloroethene	ug/kg	7.8	U	5.6	U	7.2	U
trans-1,3-Dichloropropene	ug/kg	7.8	U	5.6	U	7.2	U
Trichloroethylene (TCE)	ug/kg	7.8	U	5.6	U	7.2	U
Vinyl acetate	ug/kg	15.6	U	11.1	U	14.4	U
Vinyl chloride	ug/kg	15.6	U	11.1	U	14.4	U
Xylenes, Total	ug/kg	7.8	U	5.6	U	7.2	U
1,3-Dichlorobenzene	ug/kg	7.8	U	5.6	U	7.2	U
1,4-Dichlorobenzene	ug/kg	0.45	J	5.6	U	7.2	U
1,2-Dichlorobenzene	ug/kg	7.8	U	5.6	U	7.2	U
1,2,4--Trichlorobenzene	ug/kg	7.8	U	5.6	U	7.2	U
Bromofluorobenzene	PERCENT						
Dibromofluoromethane	PERCENT						
Toluene-d8	PERCENT						

Analytical Data Summary

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StationID	E172SB012		E172SB013		E172SB013		
SampleID	172SB01202 (3-5ft)		172SB01301 (0-1ft)		172SB01302 (3-5ft)		
DateCollected			1/18/2002				
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	55050		54860		54860		
Parameter	Units						
o-Xylene	ug/kg	6.3	U	6.8	U	6.3	U
Styrene	ug/kg	6.3	U	6.8	U	6.3	U
Tetrachloroethylene (PCE)	ug/kg	6.3	U	6.8	U	6.3	U
Toluene	ug/kg	6.3	U	0.48	J	0.47	J
trans-1,2-Dichloroethene	ug/kg	6.3	U	6.8	U	6.3	U
trans-1,3-Dichloropropene	ug/kg	6.3	U	6.8	U	6.3	U
Trichloroethylene (TCE)	ug/kg	6.3	U	6.8	U	6.3	U
Vinyl acetate	ug/kg	12.6	U	13.6	U	12.6	U
Vinyl chloride	ug/kg	12.6	U	13.6	U	12.6	U
Xylenes, Total	ug/kg	6.3	U	6.8	U	6.3	U
1,3-Dichlorobenzene	ug/kg	6.3	U	6.8	U	6.3	U
1,4-Dichlorobenzene	ug/kg	6.3	U	0.5	J	0.51	J
1,2-Dichlorobenzene	ug/kg	6.3	U	6.8	U	6.3	U
1,2,4--Trichlorobenzene	ug/kg	6.3	U	6.8	U	6.3	U
Bromofluorobenzene	PERCENT						
Dibromofluoromethane	PERCENT						
Toluene-d8	PERCENT						

Analytical Data Summary

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StationID	E172SB014		E172SB014		E172SB015		
SampleID	172SB01401 (0-1ft)		172SB01402 (3-5ft)		172SB01501 (0-1ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/30/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
o-Xylene	ug/kg	6.8	U	5.2	U	1.7	J
Styrene	ug/kg	6.8	U	5.2	UJ	4.5	U
Tetrachloroethylene (PCE)	ug/kg	6.8	U	0.39	J	4.5	U
Toluene	ug/kg	6.8	U	0.36	J	0.64	J
trans-1,2-Dichloroethene	ug/kg	6.8	U	5.2	U	4.5	U
trans-1,3-Dichloropropene	ug/kg	6.8	U	5.2	U	4.5	U
Trichloroethylene (TCE)	ug/kg	6.8	U	5.2	U	4.5	U
Vinyl acetate	ug/kg	13.7	U	10.4	UJ	9.1	U
Vinyl chloride	ug/kg	13.7	U	10.4	U	2.6	J
Xylenes, Total	ug/kg	6.8	U	5.2	U	3.4	J
1,3-Dichlorobenzene	ug/kg	6.8	U	5.2	UJ	1	J
1,4-Dichlorobenzene	ug/kg	6.8	U	0.29	J	1.6	J
1,2-Dichlorobenzene	ug/kg	6.8	U	5.2	UJ	27.3	=
1,2,4--Trichlorobenzene	ug/kg	6.8	U	5.2	UJ	4.5	U
Bromofluorobenzene	PERCENT						
Dibromofluoromethane	PERCENT						
Toluene-d8	PERCENT						

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StationID	E172SB015		E172SB016		E172SB016		
SampleID	172SB01502 (3-5ft)		172SB01601 (0-1ft)		172SB01602 (3-5ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
o-Xylene	ug/kg	472	U	0.56	J	0.34	J
Styrene	ug/kg	472	U	5.6	U	4.5	U
Tetrachloroethylene (PCE)	ug/kg	472	U	5.6	U	4.5	U
Toluene	ug/kg	51.6	J	0.5	J	0.75	J
trans-1,2-Dichloroethene	ug/kg	472	U	5.6	U	4.5	U
trans-1,3-Dichloropropene	ug/kg	472	U	5.6	U	4.5	U
Trichloroethylene (TCE)	ug/kg	73.8	J	0.64	J	4.5	U
Vinyl acetate	ug/kg	943	U	11.1	U	9.1	U
Vinyl chloride	ug/kg	943	U	11.1	U	1.1	J
Xylenes, Total	ug/kg	472	U	2.4	J	1.2	J
1,3-Dichlorobenzene	ug/kg	96.5	J	5.6	U	0.77	J
1,4-Dichlorobenzene	ug/kg	212	J	0.45	J	1.8	J
1,2-Dichlorobenzene	ug/kg	1890	=	5.6	U	17.2	=
1,2,4--Trichlorobenzene	ug/kg	472	U	5.6	U	4.5	U
Bromofluorobenzene	%PERCENT						
Dibromofluoromethane	%PERCENT						
Toluene-d8	%PERCENT						

Analytical Data Summary

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StationID	E172SB017		E172SB017		E172SB018		
SampleID	172SB01701 (0-1ft)		172SB01702 (3-5ft)		172SB01801 (0-1ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
o-Xylene	ug/kg	4.6	U	4.1	U	4.3	U
Styrene	ug/kg	4.6	U	4.1	U	4.3	U
Tetrachloroethylene (PCE)	ug/kg	4.6	U	4.1	U	2.1	J
Toluene	ug/kg	0.31	J	4.1	U	0.25	J
trans-1,2-Dichloroethene	ug/kg	4.6	U	4.1	U	4.3	U
trans-1,3-Dichloropropene	ug/kg	4.6	U	4.1	U	4.3	U
Trichloroethylene (TCE)	ug/kg	4.6	U	4.1	U	0.49	J
Vinyl acetate	ug/kg	9.2	U	8.2	U	8.6	U
Vinyl chloride	ug/kg	9.2	U	8.2	U	1.8	J
Xylenes, Total	ug/kg	4.6	U	4.1	U	4.3	U
1,3-Dichlorobenzene	ug/kg	4.6	U	4.1	U	4.3	U
1,4-Dichlorobenzene	ug/kg	0.29	J	0.23	J	0.3	J
1,2-Dichlorobenzene	ug/kg	4.6	U	4.1	U	4.3	U
1,2,4--Trichlorobenzene	ug/kg	4.6	U	4.1	U	4.3	U
Bromofluorobenzene	%PERCENT						
Dibromofluoromethane	%PERCENT						
Toluene-d8	%PERCENT						

Analytical Data Summary

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StationID	E172SB018		E172SB019		E172SB019		
SampleID	172SB01802 (3-5ft)		172SB01901 (0-1ft)		172SB01902 (3-5ft)		
DateCollected	1/18/2002		1/18/2002		1/18/2002		
DateExtracted	1/29/2002		1/29/2002		1/29/2002		
DateAnalyzed	1/29/2002		1/29/2002		1/29/2002		
SDGNumber	54860		54860		54860		
Parameter	Units						
o-Xylene	ug/kg	4.3	U	5.3	U	4.5	U
Styrene	ug/kg	4.3	U	5.3	U	4.5	U
Tetrachloroethylene (PCE)	ug/kg	4.3	U	5.3	U	4.5	U
Toluene	ug/kg	4.3	U	0.32	J	4.5	U
trans-1,2-Dichloroethene	ug/kg	4.3	U	5.3	U	4.5	U
trans-1,3-Dichloropropene	ug/kg	4.3	U	5.3	U	4.5	U
Trichloroethylene (TCE)	ug/kg	4.3	U	5.3	U	4.5	U
Vinyl acetate	ug/kg	8.6	U	10.6	U	8.9	U
Vinyl chloride	ug/kg	1.9	J	10.6	U	8.9	U
Xylenes, Total	ug/kg	4.3	U	5.3	U	4.5	U
1,3-Dichlorobenzene	ug/kg	4.3	U	5.3	U	4.5	U
1,4-Dichlorobenzene	ug/kg	0.27	J	0.31	J	0.23	J
1,2-Dichlorobenzene	ug/kg	4.3	U	5.3	U	4.5	U
1,2,4--Trichlorobenzene	ug/kg	4.3	U	5.3	U	4.5	U
Bromofluorobenzene	%PERCENT						
Dibromofluoromethane	%PERCENT						
Toluene-d8	%PERCENT						

Analytical Data Summary

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StationID	E172SB011		E172SB011		E172SB012		
SampleID	172SB01101 (0-1ft)		172SB01102 (3-5ft)		172SB01201 (0-1ft)		
DateCollected	1/18/2002				1/23/2002		
DateExtracted	1/22/2002		1/22/2002		1/25/2002		
DateAnalyzed	1/26/2002		1/26/2002		2/6/2002		
SDGNumber	54860		54860		55050		
Parameter	Units						
N-Nitrosodiphenylamine	ug/kg	494	U	368	U	477	U
Phenol	ug/kg	494	U	368	U	477	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	494	U	368	U	477	U
2-Chlorophenol	ug/kg	494	U	368	U	477	U
1,3-Dichlorobenzene	ug/kg	494	U	368	U	477	U
1,4-Dichlorobenzene	ug/kg	494	U	368	U	50.9	J
Benzyl alcohol	ug/kg	494	U	368	U	477	U
1,2-Dichlorobenzene	ug/kg	494	U	368	U	477	U
Bis(2-Chloroisopropyl)Ether	ug/kg	494	U	368	U	477	U
2-Methylphenol (o-Cresol)	ug/kg	494	U	368	U	477	U
3-Methylphenol/4-Methylphenol	ug/kg	494	U	368	U	477	U
Hexachloroethane	ug/kg	494	U	368	U	477	U
Nitrobenzene	ug/kg	494	U	368	U	477	U
Isophorone	ug/kg	494	U	368	U	477	U
2-Nitrophenol	ug/kg	494	U	368	U	477	U
2,4-Dimethylphenol	ug/kg	494	U	368	U	477	U
bis(2-Chloroethoxy) Methane	ug/kg	494	U	368	U	477	U
2,4-Dichlorophenol	ug/kg	494	U	368	U	477	U
Benzoic acid	ug/kg	2390	U	1780	U	2310	U
1,2,4-Trichlorobenzene	ug/kg	494	U	368	U	477	U
Naphthalene	ug/kg	494	U	368	U	477	UJ
4-Chloroaniline	ug/kg	494	U	368	U	477	U
Hexachlorobutadiene	ug/kg	494	U	368	U	477	U
4-Chloro-3-methylphenol	ug/kg	449	U	335	U	434	U
2-Methylnaphthalene	ug/kg	494	U	368	U	477	U
Hexachlorocyclopentadiene	ug/kg	494	U	368	U	477	U
2,4,6-Trichlorophenol	ug/kg	494	U	368	U	477	U
2,4,5-Trichlorophenol	ug/kg	2390	U	1780	U	2310	U
2-Chloronaphthalene	ug/kg	494	U	368	U	477	U
2-Nitroaniline	ug/kg	494	U	368	U	477	U

Analytical Data Summary

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StationID	E172SB012		E172SB013		E172SB013		
SampleID	172SB01202 (3-5ft)		172SB01301 (0-1ft)		172SB01302 (3-5ft)		
DateCollected			1/18/2002				
DateExtracted	1/25/2002		1/22/2002		1/22/2002		
DateAnalyzed	2/6/2002		1/26/2002		1/26/2002		
SDGNumber	55050		54860		54860		
Parameter	Units						
N-Nitrosodiphenylamine	ug/kg	442	U	449	U	416	U
Phenol	ug/kg	442	U	449	U	416	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	442	U	449	U	416	U
2-Chlorophenol	ug/kg	11.3	J	449	U	416	U
1,3-Dichlorobenzene	ug/kg	442	U	449	U	416	U
1,4-Dichlorobenzene	ug/kg	50.9	J	449	U	416	U
Benzyl alcohol	ug/kg	19.3	J	449	U	416	U
1,2-Dichlorobenzene	ug/kg	442	U	449	U	416	U
Bis(2-Chloroisopropyl)Ether	ug/kg	442	U	449	U	416	U
2-Methylphenol (o-Cresol)	ug/kg	442	U	449	U	416	U
3-Methylphenol/4-Methylphenol	ug/kg	11.3	J	449	U	416	U
Hexachloroethane	ug/kg	442	U	449	U	416	U
Nitrobenzene	ug/kg	442	U	449	U	416	U
Isophorone	ug/kg	442	U	449	U	416	U
2-Nitrophenol	ug/kg	442	U	449	U	416	U
2,4-Dimethylphenol	ug/kg	442	U	449	U	416	U
bis(2-Chloroethoxy) Methane	ug/kg	442	U	449	U	416	U
2,4-Dichlorophenol	ug/kg	442	U	449	U	416	U
Benzoic acid	ug/kg	2140	U	2180	U	2010	U
1,2,4-Trichlorobenzene	ug/kg	6.8	J	449	U	416	U
Naphthalene	ug/kg	442	UJ	9.4	J	416	U
4-Chloroaniline	ug/kg	442	U	449	U	416	U
Hexachlorobutadiene	ug/kg	442	U	449	U	416	U
4-Chloro-3-methylphenol	ug/kg	402	U	408	U	378	U
2-Methylnaphthalene	ug/kg	7.5	J	449	U	416	U
Hexachlorocyclopentadiene	ug/kg	442	U	449	U	416	U
2,4,6-Trichlorophenol	ug/kg	442	U	449	U	416	U
2,4,5-Trichlorophenol	ug/kg	2140	U	2180	U	2010	U
2-Chloronaphthalene	ug/kg	442	U	449	U	416	U
2-Nitroaniline	ug/kg	442	U	449	U	416	U

Analytical Data Summary

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	StationID	E172SB014		E172SB014	
	SampleID	172SB01401 (0-1ft)		172SB01402 (3-5ft)	
	DateCollected	1/18/2002		1/18/2002	
	DateExtracted	1/22/2002		1/22/2002	
	DateAnalyzed	1/26/2002		1/26/2002	
	SDGNumber	54860		54860	
Parameter	Units				
N-Nitrosodiphenylamine	ug/kg	462	U	392	U
Phenol	ug/kg	462	U	392	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	462	U	392	U
2-Chlorophenol	ug/kg	462	U	392	U
1,3-Dichlorobenzene	ug/kg	462	U	392	U
1,4-Dichlorobenzene	ug/kg	462	U	392	U
Benzyl alcohol	ug/kg	462	U	392	U
1,2-Dichlorobenzene	ug/kg	462	U	392	U
Bis(2-Chloroisopropyl)Ether	ug/kg	462	U	392	U
2-Methylphenol (o-Cresol)	ug/kg	462	U	392	U
3-Methylphenol/4-Methylphenol	ug/kg	462	U	392	U
Hexachloroethane	ug/kg	462	U	392	U
Nitrobenzene	ug/kg	462	U	392	U
Isophorone	ug/kg	462	U	392	U
2-Nitrophenol	ug/kg	462	U	392	U
2,4-Dimethylphenol	ug/kg	462	U	392	U
bis(2-Chloroethoxy) Methane	ug/kg	462	U	392	U
2,4-Dichlorophenol	ug/kg	462	U	392	U
Benzoic acid	ug/kg	2240	U	1900	U
1,2,4-Trichlorobenzene	ug/kg	462	U	392	U
Naphthalene	ug/kg	462	U	392	U
4-Chloroaniline	ug/kg	462	U	392	U
Hexachlorobutadiene	ug/kg	462	U	392	U
4-Chloro-3-methylphenol	ug/kg	420	U	357	U
2-Methylnaphthalene	ug/kg	462	U	392	U
Hexachlorocyclopentadiene	ug/kg	462	U	392	U
2,4,6-Trichlorophenol	ug/kg	462	U	392	U
2,4,5-Trichlorophenol	ug/kg	2240	U	1900	U
2-Chloronaphthalene	ug/kg	462	U	392	U
2-Nitroaniline	ug/kg	462	U	392	U

Analytical Data Summary

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StationID	E172SB011		E172SB011		E172SB012		
SampleID	172SB01101 (0-1ft)		172SB01102 (3-5ft)		172SB01201 (0-1ft)		
DateCollected	1/18/2002				1/23/2002		
DateExtracted	1/22/2002		1/22/2002		1/25/2002		
DateAnalyzed	1/26/2002		1/26/2002		2/6/2002		
SDGNumber	54860		54860		55050		
Parameter	Units						
3-Nitroaniline	ug/kg	2390	U	1780	U	2310	U
Dimethyl Phthalate	ug/kg	494	U	368	U	477	U
2,6-Dinitrotoluene	ug/kg	494	U	368	U	477	U
Acenaphthylene	ug/kg	494	U	368	U	477	U
Acenaphthene	ug/kg	449	U	335	U	434	U
2,4-Dinitrophenol	ug/kg	2390	UJ	1780	UJ	2310	UJ
Dibenzofuran	ug/kg	494	U	368	U	477	U
2,4-Dinitrotoluene	ug/kg	449	U	335	U	434	U
Diethyl Phthalate	ug/kg	494	U	368	U	477	U
4-Nitrophenol	ug/kg	2390	U	1780	U	2310	U
Fluorene	ug/kg	494	U	368	U	477	U
4-Chlorophenyl Phenyl Ether	ug/kg	494	U	368	U	477	U
4,6-Dinitro-2-methylphenol	ug/kg	2390	U	1780	U	2310	U
4-Nitroaniline	ug/kg	2390	U	1780	U	2310	U
Diphenylamine	ug/kg	494	U	368	U	477	U
4-Bromophenyl Phenyl Ether	ug/kg	494	U	368	U	477	U
Hexachlorobenzene	ug/kg	494	U	368	U	477	U
Pentachlorophenol	ug/kg	2390	U	1780	U	2310	U
Phenanthrene	ug/kg	25.7	J	14	J	477	U
Anthracene	ug/kg	494	U	368	U	477	U
Di-n-butyl Phthalate	ug/kg	494	U	368	U	477	U
Flouranthene	ug/kg	83.7	J	12.7	J	477	U
Pyrene	ug/kg	79	J	11.2	J	477	UJ
Benzyl Butyl Phthalate	ug/kg	494	U	368	U	477	U
Benzo(a)Anthracene	ug/kg	50.4	J	368	U	477	U
3,3'-Dichlorobenzidine	ug/kg	987	U	736	U	953	U
Chrysene	ug/kg	50.1	J	368	U	477	U
bis(2-Ethylhexyl) Phthalate	ug/kg	494	U	368	U	477	U
Di-n-octylphthalate	ug/kg	494	U	368	U	477	U
Benzo(b)Fluoranthene	ug/kg	62.2	J	18.7	J	477	U

Analytical Data Summary

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StationID	E172SB012		E172SB013		E172SB013		
SampleID	172SB01202 (3-5ft)		172SB01301 (0-1ft)		172SB01302 (3-5ft)		
DateCollected			1/18/2002				
DateExtracted	1/25/2002		1/22/2002		1/22/2002		
DateAnalyzed	2/6/2002		1/26/2002		1/26/2002		
SDGNumber	55050		54860		54860		
Parameter	Units						
3-Nitroaniline	ug/kg	2140	U	2180	U	2010	U
Dimethyl Phthalate	ug/kg	442	U	449	U	416	U
2,6-Dinitrotoluene	ug/kg	442	U	449	U	416	U
Acenaphthylene	ug/kg	6.6	J	449	U	416	U
Acenaphthene	ug/kg	8.2	J	408	U	378	U
2,4-Dinitrophenol	ug/kg	2140	UJ	2180	UJ	2010	UJ
Dibenzofuran	ug/kg	8.5	J	449	U	416	U
2,4-Dinitrotoluene	ug/kg	402	U	408	U	378	U
Diethyl Phthalate	ug/kg	442	U	449	U	416	U
4-Nitrophenol	ug/kg	2140	U	2180	U	2010	U
Fluorene	ug/kg	9	J	449	U	416	U
4-Chlorophenyl Phenyl Ether	ug/kg	9.9	J	449	U	416	U
4,6-Dinitro-2-methylphenol	ug/kg	2140	U	2180	U	2010	U
4-Nitroaniline	ug/kg	2140	U	2180	U	2010	U
Diphenylamine	ug/kg	11.4	J	449	U	416	U
4-Bromophenyl Phenyl Ether	ug/kg	9.6	J	449	U	416	U
Hexachlorobenzene	ug/kg	9.8	J	449	U	416	U
Pentachlorophenol	ug/kg	2140	U	2180	U	2010	U
Phenanthrene	ug/kg	14	J	45.5	J	416	U
Anthracene	ug/kg	11	J	10	J	416	U
Di-n-butyl Phthalate	ug/kg	442	U	449	U	416	U
Flouranthene	ug/kg	15.7	J	124	J	416	U
Pyrene	ug/kg	11.9	J	138	J	416	U
Benzyl Butyl Phthalate	ug/kg	442	U	449	U	416	U
Benzo(a)Anthracene	ug/kg	442	U	71.8	J	416	U
3,3'-Dichlorobenzidine	ug/kg	883	U	897	U	831	U
Chrysene	ug/kg	15.5	J	89	J	416	U
bis(2-Ethylhexyl) Phthalate	ug/kg	442	U	449	U	416	U
Di-n-octylphthalate	ug/kg	15.3	J	449	U	416	U
Benzo(b)Fluoranthene	ug/kg	13.9	J	110	J	416	U

Analytical Data Summary

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	StationID	E172SB014		E172SB014	
	SampleID	172SB01401 (0-1ft)		172SB01402 (3-5ft)	
	DateCollected	1/18/2002		1/18/2002	
	DateExtracted	1/22/2002		1/22/2002	
	DateAnalyzed	1/26/2002		1/26/2002	
	SDGNumber	54860		54860	
Parameter	Units				
3-Nitroaniline	ug/kg	2240	U	1900	U
Dimethyl Phthalate	ug/kg	462	U	392	U
2,6-Dinitrotoluene	ug/kg	462	U	392	U
Acenaphthylene	ug/kg	462	U	392	U
Acenaphthene	ug/kg	420	U	357	U
2,4-Dinitrophenol	ug/kg	2240	UJ	1900	UJ
Dibenzofuran	ug/kg	462	U	392	U
2,4-Dinitrotoluene	ug/kg	420	U	357	U
Diethyl Phthalate	ug/kg	462	U	392	U
4-Nitrophenol	ug/kg	2240	U	1900	U
Fluorene	ug/kg	462	U	392	U
4-Chlorophenyl Phenyl Ether	ug/kg	462	U	392	U
4,6-Dinitro-2-methylphenol	ug/kg	2240	U	1900	U
4-Nitroaniline	ug/kg	2240	U	1900	U
Diphenylamine	ug/kg	462	U	392	U
4-Bromophenyl Phenyl Ether	ug/kg	462	U	392	U
Hexachlorobenzene	ug/kg	462	U	392	U
Pentachlorophenol	ug/kg	2240	U	1900	U
Phenanthrene	ug/kg	462	U	5.8	J
Anthracene	ug/kg	462	U	392	U
Di-n-butyl Phthalate	ug/kg	462	U	392	U
Flouranthene	ug/kg	462	U	11.5	J
Pyrene	ug/kg	462	U	11.4	J
Benzyl Butyl Phthalate	ug/kg	462	U	392	U
Benzo(a)Anthracene	ug/kg	462	U	392	U
3,3'-Dichlorobenzidine	ug/kg	922	U	784	U
Chrysene	ug/kg	462	U	9.4	J
bis(2-Ethylhexyl) Phthalate	ug/kg	462	U	392	U
Di-n-octylphthalate	ug/kg	462	U	392	U
Benzo(b)Fluoranthene	ug/kg	462	U	22.9	J

Analytical Data Summary

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	StationID	E172SB011		E172SB011		E172SB012	
	SampleID	172SB01101 (0-1ft)		172SB01102 (3-5ft)		172SB01201 (0-1ft)	
	DateCollected	1/18/2002				1/23/2002	
	DateExtracted	1/22/2002		1/22/2002		1/25/2002	
	DateAnalyzed	1/26/2002		1/26/2002		2/6/2002	
	SDGNumber	54860		54860		55050	
Parameter	Units						
Benzo(k)Fluoranthene	ug/kg	45.3	J	368	U	477	U
Benzo(a)Pyrene	ug/kg	53.5	J	5.3	J	477	U
Indeno(1,2,3-c,d)pyrene	ug/kg	94.3	J	368	U	477	U
Dibenz(a,h)anthracene	ug/kg	494	U	368	U	477	U
Benzo(g,h,i)Perylene	ug/kg	50.9	J	368	U	477	U
Carbazole	ug/kg	494	U	368	U	477	U

Analytical Data Summary

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StationID	E172SB012		E172SB013		E172SB013	
SampleID	172SB01202 (3-5ft)		172SB01301 (0-1ft)		172SB01302 (3-5ft)	
DateCollected			1/18/2002			
DateExtracted	1/25/2002		1/22/2002		1/22/2002	
DateAnalyzed	2/6/2002		1/26/2002		1/26/2002	
SDGNumber	55050		54860		54860	
Parameter	Units					
Benzo(k)Fluoranthene	ug/kg	12.6	J	88.9	J	416 U
Benzo(a)Pyrene	ug/kg	55.1	J	100	J	416 U
Indeno(1,2,3-c,d)pyrene	ug/kg	442	U	111	J	416 U
Dibenz(a,h)anthracene	ug/kg	442	U	449	U	416 U
Benzo(g,h,i)Perylene	ug/kg	12.6	J	67.2	J	416 U
Carbazole	ug/kg	12.4	J	449	U	416 U

Analytical Data Summary

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	StationID	E172SB014		E172SB014	
	SampleID	172SB01401 (0-1ft)		172SB01402 (3-5ft)	
	DateCollected	1/18/2002		1/18/2002	
	DateExtracted	1/22/2002		1/22/2002	
	DateAnalyzed	1/26/2002		1/26/2002	
	SDGNumber	54860		54860	
Parameter	Units				
Benzo(k)Fluoranthene	ug/kg	462	U	6.2	J
Benzo(a)Pyrene	ug/kg	462	U	7.9	J
Indeno(1,2,3-c,d)pyrene	ug/kg	462	U	392	U
Dibenz(a,h)anthracene	ug/kg	462	U	392	U
Benzo(g,h,i)Perylene	ug/kg	462	U	392	U
Carbazole	ug/kg	462	U	392	U

Analytical Data Summary

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Parameter	Units	E172SB008		E172SB008		E172SB009	
		SampleID	DateCollected	SampleID	DateCollected	SampleID	DateCollected
		172SB00801 (0-1ft)	1/18/2002	172SB00802 (3-5ft)		172SB00901 (0-1ft)	1/18/2002
			1/22/2002		1/22/2002		1/22/2002
			2/4/2002		2/4/2002		2/4/2002
		SDGNumber	54860	SDGNumber	54860	SDGNumber	54860
Aldrin	ug/kg	1.5	U	1.6	UJ	1.5	U
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/kg	1.5	U	1.6	UJ	1.5	U
Alpha-chlordane	ug/kg	1.5	U	1.6	UJ	1.5	U
Beta BHC (Beta Hexachlorocyclohexane)	ug/kg	1.5	U	1.6	UJ	1.5	U
Chlordane	ug/kg	14.9	U	16	UJ	15.3	U
Delta BHC (Delta Hexachlorocyclohexane)	ug/kg	1.5	U	1.6	UJ	1.5	U
Dieldrin	ug/kg	2.9	U	3.1	UJ	3	U
Endosulfan I	ug/kg	1.5	U	1.6	UJ	1.5	U
Endosulfan II	ug/kg	2.9	U	3.1	UJ	3	U
Endosulfan Sulfate	ug/kg	2.9	U	3.1	UJ	3	U
Endrin Aldehyde	ug/kg	2.9	U	3.1	UJ	3	U
Endrin Ketone	ug/kg	2.9	U	3.1	UJ	3	U
Endrin	ug/kg	2.9	U	3.1	UJ	3	U
Gamma BHC (Lindane)	ug/kg	1.5	U	1.6	UJ	1.5	U
Gamma-chlordane	ug/kg	1.5	U	1.6	UJ	1.5	U
Heptachlor Epoxide	ug/kg	1.5	U	1.6	UJ	1.5	U
Heptachlor	ug/kg	1.5	U	1.6	UJ	1.5	U
Methoxychlor	ug/kg	14.9	UJ	16	UJ	15.3	UJ
p,p'-DDD	ug/kg	2.5	J	3.1	UJ	2.5	J
p,p'-DDE	ug/kg	3.4	J	3.1	UJ	3.8	J
p,p'-DDT	ug/kg	4	J	3.1	UJ	4.2	J
Toxaphene	ug/kg	95.1	U	102	UJ	97.8	U

Analytical Data Summary

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StationID	E172SB009	E172SB010	E172SB010
SampleID	172SB00902 (3-5ft)	172SB01001 (0-1ft)	172SB01002 (3-5ft)
DateCollected		1/18/2002	
DateExtracted	1/22/2002	1/22/2002	1/22/2002
DateAnalyzed	2/4/2002	2/4/2002	2/4/2002
SDGNumber	54860	54860	54860

Parameter	Units	E172SB009		E172SB010		E172SB010	
Aldrin	ug/kg	1.6	U	7.4	U	31.5	U
Alpha BHC (Alpha Hexachlorocyclohexane)	ug/kg	1.6	U	7.4	U	31.5	U
Alpha-chlordane	ug/kg	1.6	U	7.4	U	31.5	U
Beta BHC (Beta Hexachlorocyclohexane)	ug/kg	1.6	U	7.4	U	31.5	U
Chlordane	ug/kg	15.5	U	74	U	315	U
Delta BHC (Delta Hexachlorocyclohexane)	ug/kg	1.6	U	7.4	U	31.5	U
Dieldrin	ug/kg	3	U	14.2	U	60.8	U
Endosulfan I	ug/kg	1.6	U	7.4	U	31.5	U
Endosulfan II	ug/kg	3	U	14.2	U	60.8	U
Endosulfan Sulfate	ug/kg	3	U	14.2	U	60.8	U
Endrin Aldehyde	ug/kg	3	U	14.2	U	60.8	U
Endrin Ketone	ug/kg	3	U	14.2	U	60.8	U
Endrin	ug/kg	3	U	14.2	U	60.8	U
Gamma BHC (Lindane)	ug/kg	1.6	U	7.4	U	31.5	U
Gamma-chlordane	ug/kg	1.6	U	7.4	U	31.5	U
Heptachlor Epoxide	ug/kg	1.6	U	7.4	U	31.5	U
Heptachlor	ug/kg	1.6	U	7.4	U	31.5	U
Methoxychlor	ug/kg	15.5	UJ	74	UJ	315	UJ
p,p'-DDD	ug/kg	2.5	J	14.2	U	60.8	U
p,p'-DDE	ug/kg	3	J	24.5	J	60.8	U
p,p'-DDT	ug/kg	3.7	J	24.2	J	60.8	UJ
Toxaphene	ug/kg	99.2	U	472	U	2010	U

Analytical Data Summary

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StationID		E172SB008		E172SB008		E172SB009		E172SB009	
SampleID		172SB00801 (0-1ft)		172SB00802 (3-5ft)		172SB00901 (0-1ft)		172SB00902 (3-5ft)	
DateCollected		1/18/2002				1/18/2002			
DateExtracted		1/23/2002		1/23/2002		1/23/2002		1/23/2002	
DateAnalyzed		1/25/2002		1/25/2002		1/25/2002		1/25/2002	
SDGNumber		54860		54860		54860		54860	
Parameter	Units								
Antimony	mg/kg	0.572	UJ	0.588	UJ	0.594	UJ	0.585	UJ
Arsenic	mg/kg	3.59	=	7.95	=	3.91	=	4.58	=
Chromium, Total	mg/kg	29.2	=	40.6	=	47.7	=	49.3	=

Analytical Data Summary

01/13/2003 2:45 PM

StationID	E172SB010		E172SB010		E172SB011		E172SB011		
SampleID	172SB01001 (0-1ft)		172SB01002 (3-5ft)		172SB01101 (0-1ft)		172SB01102 (3-5ft)		
DateCollected	1/18/2002				1/18/2002				
DateExtracted	1/23/2002		1/23/2002		1/23/2002		1/23/2002		
DateAnalyzed	1/25/2002		1/25/2002		1/25/2002		1/25/2002		
SDGNumber	54860		54860		54860		54860		
Parameter	Units								
Antimony	mg/kg	0.574	UJ	0.577	UJ				
Arsenic	mg/kg	10.4	=	2.96	=				
Chromium, Total	mg/kg	79.1	=	13.8	=	59.6	=	27.3	=

Analytical Data Summary

01/13/2003 2:45 PM

StationID	E172SB012	E172SB012	E172SB013	E172SB013
SampleID	172SB01201 (0-1ft)	172SB01202 (3-5ft)	172SB01301 (0-1ft)	172SB01302 (3-5ft)
DateCollected	1/23/2002		1/18/2002	
DateExtracted	1/28/2002	1/28/2002	1/23/2002	1/23/2002
DateAnalyzed	1/28/2002	1/28/2002	1/25/2002	1/25/2002
SDGNumber	55050	55050	54860	54860
Parameter	Units			
Antimony	mg/kg			
Arsenic	mg/kg			
Chromium, Total	mg/kg	51.3 =	15.3 =	39.5 = 21.3 =

Analytical Data Summary

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Parameter	Units	E172SB014		E172SB014	
StationID		E172SB014		E172SB014	
SampleID		172SB01401 (0-1ft)		172SB01402 (3-5ft)	
DateCollected		1/18/2002		1/18/2002	
DateExtracted		1/23/2002		1/23/2002	
DateAnalyzed		1/25/2002		1/25/2002	
SDGNumber		54860		54860	
Antimony	mg/kg				
Arsenic	mg/kg				
Chromium, Total	mg/kg	43.9	=	21.1	=

Data Validation Summary - Charleston Naval Complex - Zone E

TO: Sam Naik/CH2M HILL/ATL
FROM: Herb Kelly/CH2M HILL/GNA
DATE: April 16, 2001

The purpose of this memorandum is to present the results of the data validation process for the samples collected SWMU 172 in Zone E. The samples were collected between the dates of January 18 and February 26, 2002.

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

The Quality Control areas that were review and the resulting findings are documented within each subsection that follows. This data was 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 (EPA) *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., in Charleston, South Carolina, for the following analyses: SW-846 8260 Volatile Organic Compounds (VOC), SW-846 8270 Semivolatile Organic Compounds (SVOC), SW-846 8081 Organochlorine Pesticides, and Metals (Antimony, Arsenic, Chromium) following SW-846 6010 methodology.

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.

Attachment 1 lists the changes in data qualifiers, due to the validation process.

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 is 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

Site	Sample ID	Sample Name	Sample ID	Collection Date	Sample Type								
54860	E172SB010	172CB01002	54860014	01/18/02	SO	FD		3	5	X	X		
54860	E172SB013	172CB01301	54860005	01/18/02	SO	FD		0	1	X		X	X
54860	E172SB008	172SB00801	54860008	01/18/02	SO	N		0	1	X	X		
54860	E172SB008	172SB00801MS	1200137022	01/18/02	SO	MS		0	1		X		
54860	E172SB008	172SB00801SD	1200137023	01/18/02	SO	SD		0	1		X		
54860	E172SB008	172SB00802	54860009	01/18/02	SO	N		3	5	X	X		
54860	E172SB009	172SB00901	54860010	01/18/02	SO	N		0	1	X	X		
54860	E172SB009	172SB00902	54860011	01/18/02	SO	N		3	5	X	X		
54860	E172SB010	172SB01001	54860012	01/18/02	SO	N		0	1	X	X		
54860	E172SB010	172SB01002	54860013	01/18/02	SO	N		3	5	X	X		
54860	E172SB011	172SB01101	54860002	01/18/02	SO	N		0	1	X		X	X
54860	E172SB011	172SB01102	54860003	01/18/02	SO	N		3	5	X		X	X
54860	E172SB013	172SB01301	54860004	01/18/02	SO	N		0	1	X		X	X
54860	E172SB013	172SB01302	54860006	01/18/02	SO	N		3	5	X		X	X
54860	E172SB013	172SB01302LR	54860006	01/18/02	SO	LR	DL	3	5			X	
54860	E172SB014	172SB01401	54860007	01/18/02	SO	N		0	1	X		X	X
54860	E172SB014	172SB01402	54860001	01/18/02	SO	N		3	5	X		X	X
54860	E172SB014	172SB01402MS	1200136995	01/18/02	SO	MS		3	5				X
54860	E172SB014	172SB01402MS	1200137446	01/18/02	SO	MS		3	5	X			

SPR	STATION	PARAMETER	VALUE	DATE	UNIT	TYPE	STATUS	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
54860	E172SB014	172SB01402MS	1200141293	01/18/02	SO	MS		3	5								X
54860	E172SB014	172SB01402SD	1200136996	01/18/02	SO	SD		3	5								X
54860	E172SB014	172SB01402SD	1200137447	01/18/02	SO	SD		3	5	X							
54860	E172SB014	172SB01402SD	1200141294	01/18/02	SO	SD		3	5								X
54860	E172SB015	172SB01501	54860015	01/18/02	SO	N		0	1								X
54860	E172SB015	172SB01502	54860016	01/18/02	SO	N		3	5								X
54860	E172SB016	172SB01601	54860017	01/18/02	SO	N		0	1								X
54860	E172SB016	172SB01601LR	54860017	01/18/02	SO	LR	DL	0	1								X
54860	E172SB016	172SB01602	54860018	01/18/02	SO	N		3	5								X
54860	E172SB017	172SB01701	54860019	01/18/02	SO	N		0	1								X
54860	E172SB017	172SB01702	54860020	01/18/02	SO	N		3	5								X
54860	E172SB018	172SB01801	54860021	01/18/02	SO	N		0	1								X
54860	E172SB018	172SB01802	54860022	01/18/02	SO	N		3	5								X
54860	E172SB019	172SB01901	54860023	01/18/02	SO	N		0	1								X
54860	E172SB019	172SB01902	54860024	01/18/02	SO	N		3	5								X
54860	LABQC	1200136993	1200136993		SQ	LB											X
54860	LABQC	1200136994	1200136994		SQ	BS											X
54860	LABQC	1200137020	1200137020		SQ	LB							X				
54860	LABQC	1200137021	1200137021		SQ	BS							X				
54860	LABQC	1200137444	1200137444		SQ	LB						X					
54860	LABQC	1200137448	1200137448		SQ	BS						X					
54860	LABQC	1200141290	1200141290		SQ	LB											X

Site	Sample ID	Sample ID	Sample ID	Date	Method	Parameter	Result	Result	Result	Result	Result	Result
54860	LABQC	1200141291	1200141291		SQ	LB						X
54860	LABQC	1200141292	1200141292		SQ	BS						X
54860	LABQC	1200142287	1200142287		SQ	LB						X
54860	LABQC	1200142288	1200142288		SQ	BS						X
54860W	FIELDQC	172EB008M1	54862001	01/18/02	WQ	EB			X	X	X	X
54860W	FIELDQC	172EB008M1LR	54862001	01/18/02	WQ	LR	RE					X
54860W	FIELDQC	172EB008M1MS	1200137414	01/18/02	WQ	MS			X			
54860W	FIELDQC	172EB008M1SD	1200137415	01/18/02	WQ	SD			X			
54860W	FIELDQC	172EW001M1	54862004	01/18/02	WQ	EB						X
54860W	E172GW001	172GW001M1	54862003	01/18/02	WG	N						X
54860W	E172GW001	172GW001M1MS	1200140751	01/18/02	WG	MS						X
54860W	E172GW001	172GW001M1SD	1200140752	01/18/02	WG	SD						X
54860W	FIELDQC	172TB008M1	54862002	01/18/02	WQ	TB						X
54860W	LABQC	1200136215	1200136215		WQ	LB				X		
54860W	LABQC	1200136216	1200136216		WQ	BS				X		
54860W	LABQC	1200136985	1200136985		WQ	LB						X
54860W	LABQC	1200136986	1200136986		WQ	BS						X
54860W	LABQC	1200137412	1200137412		WQ	LB			X			
54860W	LABQC	1200137416	1200137416		WQ	BS			X			
54860W	LABQC	1200140749	1200140749		WQ	LB						X
54860W	LABQC	1200140750	1200140750		WQ	BS						X
54860W	LABQC	1200143055	1200143055		WQ	LB						X

SPC	Product	Sample ID	Sample ID	Date	Method	Sample	1	2	3	4	5	6	7	8	9	10
54860W	LABQC	1200143060	1200143060		WQ	BS										X
55050	E172SB012	172SB01202	55050002	01/18/02	SO	N		3	5	X				X		X
55050	E172SB012	172SB01201	55050001	01/23/02	SO	N		0	1	X				X		X
55050	LABQC	1200138961	1200138961		SQ	LB										X
55050	LABQC	1200138962	1200138962		SQ	BS										X
55050	LABQC	1200139489	1200139489		SQ	LB				X						
55050	LABQC	1200139493	1200139493		SQ	BS				X						
55050	LABQC	1200141291	1200141291		SQ	LB								X		
55050	LABQC	1200141292	1200141292		SQ	BS								X		
56784	FIELDQC	172EP001M2	56784005	02/26/02	WQ	EB								X		
56784	E172GP001	172GP00118	56784001	02/26/02	WG	N								X		
56784	E172GP001	172GP00118MS	1200171401	02/26/02	WG	MS								X		
56784	E172GP001	172GP00118SD	1200171402	02/26/02	WG	SD								X		
56784	E172GP002	172GP00218	56784002	02/26/02	WG	N								X		
56784	E172GP003	172GP00318	56784003	02/26/02	WG	N								X		
56784	FIELDQC	172HP00318	56784004	02/26/02	WG	FD								X		
56784	FIELDQC	172TP001M2	56784006	02/26/02	WQ	TB								X		
56784	LABQC	1200171355	1200171355		WQ	LB								X		
56784	LABQC	1200171356	1200171356		WQ	BS								X		
56784	LABQC	1200177540	1200177540		WQ	LB								X		
56784	LABQC	1200177541	1200177541		WQ	BS								X		
56784	LABQC	1200177555	1200177555		WQ	LB								X		

Sample ID	Sample Type	Sample ID	Sample ID	Matrix	Sample Type	Matrix						
56784	LABQC	1200177556	1200177556		WQ	BS						X
<p>MATRIX CODE</p> <p>SO - Soil SQ - Soil QC Samples WG - Groundwater WQ - Water QC Samples</p> <p>SAMPLE TYPE CODE</p> <p>BS - Blank Spike EB - Equipment Blank FD - Field Duplicate N - Native Sample LB - Laboratory Blank LR - Laboratory Replicate MS - Matrix Spike SD - Matrix Spike duplicate TB - Trip Blank</p> <p>LR TYPE CODE</p> <p>DL - Dilution RE - Re-analysis</p> <p>ANALYSIS CODE</p> <p>Pest - Pesticides VOC - Volatile Organic Compounds SVOC - Semivolatile Organic Compounds</p>												

Organic Parameters

Quality Control Review

The following list represents the QA/QC measures that were 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.
- **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.
- **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.
- **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-86 method 8000, a criteria of 40% Relative Percent Difference (RPD) was used as the acceptance limit.

Organochlorine Pesticide Analyses

The QA/QC parameters for the Organochlorine Pesticide analyses by method SW-846 8081 for all of the samples were within acceptable control limits, except as noted below:

Blank Samples

The only parameter detected in associated blank samples was 4,4'-DDT, detected in the equipment blank sample, 172EB008M1, at a concentration of 0.013 ug/L. No results were qualified due to possible blank contamination.

Surrogate Recoveries

All surrogate recoveries were within acceptable quality control limits, except as noted in Table 2.

TABLE 2
Surrogate Recoveries Out of QC Limits: Organochlorine Pesticides
Charleston Naval Complex, Zone E, Charleston, SC

SDG	Sample	Parameter	Recovery (Col#1/Col#2)	Recovery Limits	Flag
54860	54860008	Decachlorobiphenyl (DCB)	53*/69	60-150	No flags, recovery ok on 2 nd column, TCMX recoveries ok
	54860009	Tetrachloro-m-xylene (TCMX)	50*/50*	60-150	Flag detects J, non-detects UJ
		Decachlorobiphenyl	42*/63	60-150	
	54860011	Decachlorobiphenyl	54*/72	60-150	No flags, recovery ok on 2 nd column, TCMX recoveries ok
54860W	54862001	Decachlorobiphenyl	40*/64	60-150	
* - out of control limits					

Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as listed in **Table 3**.

TABLE 3

Initial and Continuing Calibration Criteria Exceptions: Organochlorine Pesticides
Charleston Naval Complex, Zone E, Charleston, SC

Instrument/ Calibration Date	Analyte	% Difference Col#1 / Col#2	Associated Samples
ECD1A-CCAL-02/04, 1713	Toxaphene	17.0 / 44.5 high	54860 - 008-013
ECD1A-CCAL-02/04, 2044	Dieldrin	16.0 / 1.0 high	54860 - 008-014
	Endrin	16.0 / 0.5 high	
	Gamma-chlordane	17.0 / 1.0 high	
	4,4'-DDT	12.0 / 25.0 low	
	Methoxychlor	5.0 / 16.4 low	
ECD1A-CCAL-02/04, 2105	Gamma-chlordane	16.0 / 1.0 high	54860-014
	4,4'-DDT	14.0 / 26.5 low	
	Methoxychlor	1.0 / 19.2 low	
SGJECD1-CCAL-11/29, 1949	4,4'-DDT	7.4 / 17.2 low	S117518B*6, 7, 10-12
	Alpha-BHC	18.4 / 12.0 high	

Flags were applied to the compounds in the associated samples in the following manner:

- When the percent difference (%D) was low in the continuing calibration standards, detected compounds were flagged "J" and non-detected compounds were flagged "UJ", as estimated.
- When the percent difference was high, detected compounds were flagged "J", as estimated. Non-detected compounds were not flagged.

Second Column Confirmation

The second column confirmation percent difference (%D) for some detected parameters, exceeded the 40 %D criteria. Those results were flagged "J", as estimated. The laboratory reported the lower of the two concentrations. The individual samples and specific compounds that were flagged are listed in [Table 4](#) below.

TABLE 4
Second Column Confirmation out of Criteria: Organochlorine Pesticides
Charleston Naval Complex, Zone E, Charleston, SC

SDG	Sample ID	Lab Sample ID	Parameter
54860	172SB00801	54860008	p,p'-DDD
54860	172SB00901	54860010	p,p'-DDD
54860	172SB00902	54860011	p,p'-DDD
54860	172SB00801	54860008	p,p'-DDE
54860	172SB00901	54860010	p,p'-DDE
54860	172SB00902	54860011	p,p'-DDE
54860	172SB01001	54860012	p,p'-DDE
54860	172SB00801	54860008	p,p'-DDT
54860	172SB00901	54860010	p,p'-DDT
54860	172SB00902	54860011	p,p'-DDT
54860	172SB01001	54860012	p,p'-DDT

Volatile Organic Compounds (VOC) Analyses

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

Blanks

The VOC target parameters detected in blank samples are listed in [Table 5](#).

TABLE 5
Equipment Blank Contamination: VOCs
Charleston Naval Complex, Zone E, Charleston, SC

SDG	Sample ID	Lab Sample ID	Sample Type	Parameter	Lab Result	Units	Flag Concentrations
56784	1200171355	1200171355	LB	1,2-DICHLOROBENZENE	0.23	ug/L	1.15 µg/L or µg/Kg
56784	172TP001M2	56784006	TB	1,2-DICHLOROBENZENE	0.18	ug/L	0.9 µg/L or µg/Kg
54860W	1200140749	1200140749	LB	1,4-DICHLOROBENZENE	0.19	ug/L	0.95 µg/L or µg/Kg
56784	1200171355	1200171355	LB	1,4-DICHLOROBENZENE	0.22	ug/L	1.1 µg/L
56784	1200177540	1200177540	LB	1,4-DICHLOROBENZENE	0.2	ug/L	1 µg/L
56784	172EP001M2	56784005	EB	ACETONE	4.7	ug/L	47 µg/L
56784	172TP001M2	56784006	TB	ACETONE	10.1	ug/L	101 µg/L
56784	1200171355	1200171355	LB	METHYLENE CHLORIDE	2.4	ug/L	24 µg/L
56784	1200177555	1200177555	LB	METHYLENE CHLORIDE	2.4	ug/L	24 µg/L
56784	172EP001M2	56784005	EB	METHYLENE CHLORIDE	3.8	ug/L	38 µg/L
56784	172TP001M2	56784006	TB	METHYLENE CHLORIDE	2.8	ug/L	28 µg/L
56784	1200171355	1200171355	LB	TOLUENE	0.17	ug/L	0.85 µg/L
56784	1200177555	1200177555	LB	TOLUENE	0.18	ug/L	0.9 µg/L

If a target parameter determined to be a common contaminant was reported in a field sample, and the concentration was below the level determined to be due to blank contamination, the following actions were taken:

- If the concentration was above the reporting limit, the numeric result was unchanged, but it was flagged "U", as undetected.
- If the concentration was below the reporting limit, the numeric result was changed to the value of the reporting limit, and it was flagged "U", as undetected.

The results qualified due to blank contamination are listed in Attachment 1.

Recoveries - Surrogate, MS/MSD and LCS/LCSD

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD), Laboratory Control Sample (LCS) and Laboratory Control Duplicate Sample (LCSD) recoveries were within acceptable quality control limits, except as noted in Table 6 below.

TABLE 6
Surrogate, MS/MSD and LCS/LCSD Recoveries Out of QC Limits: VOCs
Charleston Naval Complex, Zone E, Charleston, SC

SDG	Sample	Parameter	Recovery	Recovery Limits	Associated Samples	Flag
54860	#1 / 172SB01402 (MS/SD)	Vinyl Acetate	0/0	70-130	54860001	Detects-J, non-detects- UJ
		Styrene	57.4/58.2	70-130		
		1,3-Dichlorobenzene	57.2/50.4	70-130		
		1,4-Dichlorobenzene	54.0/48.4	70-130		
		1,2-Dichlorobenzene	55.6/48.8	70-130		
		1,2,4-Trichlorobenzene	30.0/27.0	70-130		
		1,2,3-Trichlorobenzene	27.2/24.0	70-130		
	VBLK02LCS/1200 142288	2-Chloroethylvinyl ether	134.8	70-130	Detects only J	
54860W	#3 / 172GW001M1 (MS/SD)	Vinyl Acetate	52.8/51.2	70-130	54862003	Detects-J, non-detects- UJ
		2-Chloroethylvinyl ether	0/0	70-130		
56784	#1 / 172GP0018 (MS/SD)	Chloromethane	58.4 / 62.4	70-130	56784001	Detects-J, non-detects- UJ
		2-Chloroethylvinyl ether	0/0	70-130		
	VBLK02LCS/1200 177541	2-Chloroethylvinyl ether	134	70-130	Detects only J	

* - out of control limits

- In addition to the samples listed in the Table above, the recoveries of Toluene-d8 for several samples in SDG 56784 ranged from 111 to 116 percent. Although these recoveries were slightly above the QAPP limits of 88 -110 percent, the recoveries of the other surrogates were all greater than 99 percent. Therefore no flags were applied

Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as listed in **Table 7**.

TABLE 7

Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: VOC
Charleston Naval Complex, Zone E, Charleston, SC

Instrument/Calibration Date	Analyte	%Relative Standard Deviation or R ² (ICAL)/ %Difference (CCAL)	Associated Samples
VOA8-CCAL-01/29, 0659	2-Chloroethyl vinyl ether	44.9% high	54860-001-6, 15-24 55050-001, 002
VOA8-CCAL-01/30, 0704	2-Chloroethyl vinyl ether	49.6% high	54860-007, 6DL, 17DL
VOA8-CCAL-01/28, 1914	2-Chloroethyl vinyl ether	39.9% high	54860W-all samples
	Vinyl Acetate	38.1% low	
VOA5-CCAL-03/04, 1933	Carbon Disulfide	21.0% high	56784006
	2-Chloroethyl vinyl ether	22.5% high	
VOA5-CCAL-03/05, 0715	Chloromethane	26.3% low	56784-001-5
	Vinyl Acetate	22.3% low	
	2-Chloroethyl vinyl ether	34.1% high	
	1,2,4-Trichlorobenzene	20.5% high	

Flags were applied to the compounds in the associated samples in the following manner:

- When the percent difference (%D) was low in the continuing calibration standards, detected compounds were flagged "J" and non-detected compounds were flagged "UJ", as estimated.
- When the percent difference (%D) was high in the continuing calibration standards, detected compounds were flagged "J", as estimated. Non-detected compounds were not flagged.

Field Duplicate Samples

All Field Duplicate Samples were within acceptable quality control limits, except as noted below.

- The percent Difference for Acetone in the Native/Field Duplicate sample 172SB01301/172CB01301 was 67.3 percent. No flags were applied due to Field Duplicate precision.

Semivolatile Organic Compounds (SVOC) Analyses

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

Holding Times

All holding times were met except for the re-extraction of samples 54862001/172EB008M1. This sample was re-extracted six days beyond holding time, and re-analyzed due to zero percent recoveries of all acid surrogate compounds. Upon re-analysis, all recoveries were within QC limits. The acid compounds were qualified "R", rejected in the original analysis. The results for the acid compounds from the re-analysis were used, but qualified as estimated, due to holding time exceedance. Detect compounds were qualified "J", and non-detected compounds qualified "UJ".

Blanks

The SVOC target parameters detected in blank samples are listed in [Table 8](#).

TABLE 8
Equipment Blank Contamination: SVOCs
Charleston Naval Complex, Zone E, Charleston, SC

SDG	Lab Sample ID	Sample ID	Sample Type	Parameter	Lab Result	Units	Flag Concentrations
54860	1200136993	1200136993	LB	bis(2-ETHYLHEXYL) PHTHALATE	22.3	ug/kg	< 22.3 ug/kg
	1200136993	1200136993	LB	DIETHYL PHTHALATE	25.8	ug/kg	< 25.8 ug/kg
54860W	1200143055	1200143055	LB	bis(2-ETHYLHEXYL) PHTHALATE	2.1	ug/L	< 2.1 ug/L
55050	1200138961	1200138961	LB	bis(2-ETHYLHEXYL) PHTHALATE	84	ug/kg	< 84 ug/kg
	1200138961	1200138961	LB	DIETHYL PHTHALATE	30.2	ug/kg	< 30.2 ug/kg
	1200138961	1200138961	LB	DI-n-BUTYL PHTHALATE	49	ug/kg	< 49 ug/kg

If a target parameter determined to be a common contaminant was reported in a field sample, and the concentration was below the level determined to be due to blank contamination, the following actions were taken:

- If the concentration was above the reporting limit, the numeric result was unchanged, but it was flagged "U", as undetected.
- If the concentration was below the reporting limit, the numeric result was changed to the value of the reporting limit, and it was flagged "U", as undetected.

The results qualified due to blank contamination are listed in [Attachment 1](#).

Recoveries - Surrogate, MS/MSD and LCS/LCSD

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD), Laboratory Control Sample (LCS) and Laboratory Control Duplicate Sample (LCSD) recoveries were within acceptable quality control limits, except as noted in below.

- SDG 54860W - As noted in the Holding Time section above, the recoveries of the acid surrogates for sample 54862001/172EB008M1 were initially out of QC limits. This sample were re-extracted and re-analyzed with the surrogate recoveries within QC limits.

Initial and Continuing Calibration Criteria

All initial and continuing calibration criteria were met except as noted in [Table 8](#) below.

TABLE 8

Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: SVOCs
Charleston Naval Complex, Zone E, Charleston, SC

Instrument/Calibration Date	Analyte	%Relative Standard Deviation (ICAL)/ %Difference (CCAL)	Associated Samples
MSD7-ICAL-01/26, 1412	2,4-Dinitrophenol	30.8% low	54860 – all samples
	4-Nitroaniline	25.8% low	
MSD5-ICAL-01/28, 1911	Naphthalene	0.985	55050 – all samples
	2,4-Dinitrophenol	0.987	
MSD5-CCAL-02/05, 1501	Bis(2-chloroethyl)ether	20.4% high	55050 – all samples
	Pyrene	24.1% low	

Flags were applied to the compounds in the associated samples in the following manner:

- When the percent Relative Standard Deviation (%RSD) or correlation coefficient (R^2) was out in the initial calibration, all associated samples were qualified. Detected compounds were flagged "J" and non-detected compounds were flagged "UJ", as estimated.
- When the percent difference (%D) was low in the continuing calibration standards, detected compounds were flagged "J" and non-detected compounds were flagged "UJ", as estimated.
- When the percent difference (%D) was high in the continuing calibration standards, detected compounds were flagged "J", as estimated. Non-detected compounds were not flagged.

Inorganic Parameters

Quality Control Review

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

- **Holding Times** – The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples** – Sample preparation, initial calibration blanks/continuing calibration blanks, and equipment 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.
- **Lab Control Sample (LCS)** – This sample is a "controlled matrix", in which target parameters have been added prior to digestion/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.
- **Pre/Post Digestion Spike (MS/MSD)** – 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.
- **ICP Interference Check Sample** – This sample verifies the lab's interelement and background correction factors.
- **Initial Calibration Verification** – This parameter ensures that the instrument is capable of producing acceptable quantitative data for the target analyte list to be measured.
- **Continuing Calibration Verification** – This one-point, mid-range parameter establishes that the initial calibration is still valid by checking the performance of the instrument on a continual basis.
- **ICP Serial Dilution** – The serial dilution of samples quantitated by ICP determines whether or not significant physical or chemical interferences exist due to the sample matrix.

Metals Analyses

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

Blanks

The Metals target parameters detected in blank samples are listed in [Table 9](#).

TABLE 9
Equipment Blank Contamination: Metals
Charleston Naval Complex, Zone E, Charleston, SC

SDG	Lab Sample ID	Sample ID	Sample Type	Parameter	Lab Result	Units	Flag Concentrations
54860	1200137444	1200137444	LB	ARSENIC	0.28	mg/kg	1.4 mg/Kg
	CCB		CCB	ARSENIC	3.06	ug/L	1.53 mg/Kg
	CCB		CCB	CHROMIUM	0.798	ug/L	0.399 mg/Kg
54860W	54862001	172EB008M1	EB	ANTIMONY	6.49	ug/L	3.245 mg/Kg
54860W	1200137412	1200137412	LB	ARSENIC	3.03	ug/L	15.15 ug/L

If a target parameter was reported in a field sample, and the concentration was below the level determined to be due to blank contamination (5 times the concentration in the associated QC blank samples), it was flagged as "U", not detected. Initial and continuing calibration blanks were also evaluated for possible contamination.

The results qualified due to blank contamination are listed in Attachment 1.

Recoveries - Surrogate, MS/MSD and LCS/LCSD

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD), Laboratory Control Sample (LCS) and Laboratory Control Duplicate Sample (LCSD) recoveries were within acceptable quality control limits, except as noted in below.

- SDG 54860 – The antimony recoveries in the MS/MSD samples, 54560001/172SB01402 were below QC limits of 75-125 percent, at 44.6 and 42.8 percent respectively. All antimony results for samples in SDG 54860 were qualified as estimated. Detected results were qualified "J", and non-detected results were qualified "UJ".

Field Duplicate Samples

All Field Duplicate Samples were within acceptable quality control limits, except as noted below.

- The percent Difference for Chromium in the Native/Field Duplicate sample 172SB01301/172CB01301 was 72.4 percent. No flags were applied due to Field Duplicate precision.

Rejected Data

All of the rejected data listed in Attachment I were associated with re-runs and dilutions (you can only have a single valid result per parameter per sample). No other data was rejected such that there is not a valid result for that parameter in each sample.

Conclusion

A review of the analytical data submitted regarding the investigation of Site 172 in Zone E 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 as indicated above, however, it did not affect data usability for those specific 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.

Attachment 1 - Changed Qualifiers and Results
Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
54860	172CB01002	54860014	SO	PEST	SW8081	METHOXYCHLOR	154	U	154	UJ	ug/kg	CC
54860	172CB01002	54860014	SO	PEST	SW8081	p,p'-DDT	29.7	U	29.7	UJ	ug/kg	CC
54860	172CB01002	54860014	SO	METAL	SW8010	ANTIMONY	0.597	UN	0.597	UJ	mg/kg	MS
54860	172CB01301	54860005	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	35.1	JB	420	U	ug/kg	BL
54860	172CB01301	54860005	SO	SVOA	SW8270	DIETHYL PHTHALATE	39.2	JB	420	U	ug/kg	BL
54860	172CB01301	54860005	SO	SVOA	SW8270	2,4-DINITROPHENOL	2030	U	2030	UJ	ug/kg	CC
54860	172SB00801	54860008	SO	PEST	SW8081	p,p'-DDD	2.5	JP	2.5	J	ug/kg	2C
54860	172SB00801	54860008	SO	PEST	SW8081	p,p'-DDE	3.4	P	3.4	J	ug/kg	2C
54860	172SB00801	54860008	SO	PEST	SW8081	p,p'-DDT	4	P	4	J	ug/kg	2C, CC
54860	172SB00801	54860008	SO	PEST	SW8081	METHOXYCHLOR	14.9	U	14.9	UJ	ug/kg	CC
54860	172SB00801	54860008	SO	METAL	SW8010	ANTIMONY	0.572	UN	0.572	UJ	mg/kg	MS
54860	172SB00802	54860009	SO	METAL	SW8010	ANTIMONY	0.588	UN	0.588	UJ	mg/kg	MS
54860	172SB00802	54860009	SO	PEST	SW8081	ALDRIN	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ALPHA BHC	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ALPHA-CHLORDANE	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	BETA BHC	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	Chlordane	16	U	16	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	DELTA BHC	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	DIELDRIN	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ENDOSULFAN I	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ENDOSULFAN II	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ENDOSULFAN SULFATE	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ENDRIN	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ENDRIN ALDEHYDE	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	ENDRIN KETONE	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	GAMMA BHC (LINDANE)	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	GAMMA-CHLORDANE	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	HEPTACHLOR	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	HEPTACHLOR EPOXIDE	1.6	U	1.6	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	p,p'-DDD	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	p,p'-DDE	3.1	U	3.1	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	TOXAPHENE	102	U	102	UJ	ug/kg	SS
54860	172SB00802	54860009	SO	PEST	SW8081	METHOXYCHLOR	16	U	16	UJ	ug/kg	SS, CC
54860	172SB00802	54860009	SO	PEST	SW8081	p,p'-DDT	3.1	U	3.1	UJ	ug/kg	SS, CC
54860	172SB00901	54860010	SO	PEST	SW8081	p,p'-DDD	2.5	JP	2.5	J	ug/kg	2C
54860	172SB00901	54860010	SO	PEST	SW8081	p,p'-DDE	3.8	P	3.8	J	ug/kg	2C
54860	172SB00901	54860010	SO	PEST	SW8081	p,p'-DDT	4.2	P	4.2	J	ug/kg	2C, CC
54860	172SB00901	54860010	SO	PEST	SW8081	METHOXYCHLOR	15.3	U	15.3	UJ	ug/kg	CC
54860	172SB00901	54860010	SO	METAL	SW8010	ANTIMONY	0.594	UN	0.594	UJ	mg/kg	MS

Attachment 1 - Change Qualifiers and Results
Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
54860	172SB00902	54860011	SO	PEST	SW8081	p,p'-DDD	2.5	JP	2.5	J	ug/kg	2C
54860	172SB00902	54860011	SO	PEST	SW8081	p,p'-DDE	3	P	3	J	ug/kg	2C
54860	172SB00902	54860011	SO	PEST	SW8081	p,p'-DDT	3.7	P	3.7	J	ug/kg	2C, CC
54860	172SB00902	54860011	SO	PEST	SW8081	METHOXYCHLOR	15.5	U	15.5	UJ	ug/kg	CC
54860	172SB00902	54860011	SO	METAL	SW6010	ANTIMONY	0.585	UN	0.585	UJ	mg/kg	MS
54860	172SB01001	54860012	SO	PEST	SW8081	p,p'-DDE	24.5	P	24.5	J	ug/kg	2C
54860	172SB01001	54860012	SO	PEST	SW8081	p,p'-DDT	24.2	P	24.2	J	ug/kg	2C, CC
54860	172SB01001	54860012	SO	PEST	SW8081	METHOXYCHLOR	74	U	74	UJ	ug/kg	CC
54860	172SB01001	54860012	SO	METAL	SW6010	ANTIMONY	0.574	UN	0.574	UJ	mg/kg	MS
54860	172SB01002	54860013	SO	PEST	SW8081	METHOXYCHLOR	315	U	315	UJ	ug/kg	CC
54860	172SB01002	54860013	SO	PEST	SW8081	p,p'-DDT	60.8	U	60.8	UJ	ug/kg	CC
54860	172SB01002	54860013	SO	METAL	SW6010	ANTIMONY	0.577	UN	0.577	UJ	mg/kg	MS
54860	172SB01101	54860002	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	25	JB	494	U	ug/kg	BL
54860	172SB01101	54860002	SO	SVOA	SW8270	DIETHYL PHTHALATE	46.2	JB	494	U	ug/kg	BL
54860	172SB01101	54860002	SO	SVOA	SW8270	2,4-DINITROPHENOL	2390	U	2390	UJ	ug/kg	CC
54860	172SB01102	54860003	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	36.9	JB	368	U	ug/kg	BL
54860	172SB01102	54860003	SO	SVOA	SW8270	DIETHYL PHTHALATE	32.5	JB	368	U	ug/kg	BL
54860	172SB01102	54860003	SO	SVOA	SW8270	2,4-DINITROPHENOL	1780	U	1780	UJ	ug/kg	CC
54860	172SB01301	54860004	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	30.4	JB	449	U	ug/kg	BL
54860	172SB01301	54860004	SO	SVOA	SW8270	DIETHYL PHTHALATE	39.6	JB	449	U	ug/kg	BL
54860	172SB01301	54860004	SO	SVOA	SW8270	2,4-DINITROPHENOL	2180	U	2180	UJ	ug/kg	CC
54860	172SB01302	54860006	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	36.4	JB	418	U	ug/kg	BL
54860	172SB01302	54860006	SO	SVOA	SW8270	DIETHYL PHTHALATE	35.1	JB	418	U	ug/kg	BL
54860	172SB01302	54860006	SO	SVOA	SW8270	2,4-DINITROPHENOL	2010	U	2010	UJ	ug/kg	CC
54860	172SB01302	54860006	SO	VOA	SW8260	ACETONE	2440	E	2440	R	ug/kg	LR
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,1,1-TRICHLOROETHANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,1,2,2-TETRACHLOROETHANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,1,2-TRICHLOROETHANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,1-DICHLOROETHANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,1-DICHLOROETHENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,2,3-Trichlorobenzene	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,2,4-TRICHLOROENZENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,2-DICHLOROENZENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,2-DICHLOROETHANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,2-Dichloroethene (total)	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,2-DICHLOROPROPANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,3-DICHLOROENZENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	1,4-DICHLOROENZENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	2-BUTANONE	1310	U	1310	R	ug/kg	DL

Attachment 1 - Changed Qualifiers and Results
Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
54860	172SB01302LR	54860006	SO	VOA	SW8260	2-Chloroethyl vinyl ether	1310	U	1310	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	2-HEXANONE	1310	U	1310	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	4-METHYL-2-PENTANONE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	BENZENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	BROMODICHLOROMETHANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	BROMOFORM	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	BROMOMETHANE	1310	U	1310	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	CARBON DISULFIDE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	CARBON TETRACHLORIDE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	CHLOROBENZENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	CHLOROETHANE	1310	U	1310	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	CHLOROFORM	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	CHLOROMETHANE	1310	U	1310	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	cis-1,2-DICHLOROETHYLENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	cis-1,3-DICHLOROPROPENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	DIBROMOCHLOROMETHANE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	ETHYLBENZENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	m+p Xylene	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	METHYLENE CHLORIDE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	o-Xylene	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	STYRENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	TETRACHLOROETHYLENE(PCE)	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	TOLUENE	67	DJ	67	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	trans-1,2-DICHLOROETHENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	trans-1,3-DICHLOROPROPENE	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	TRICHLOROETHYLENE (TCE)	656	U	656	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	Vinyl acetate	1310	U	1310	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	VINYL CHLORIDE	1310	U	1310	R	ug/kg	DL
54860	172SB01302LR	54860006	SO	VOA	SW8260	XYLENES, TOTAL	656	U	656	R	ug/kg	DL
54860	172SB01401	54860007	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	40.1	JB	462	U	ug/kg	BL
54860	172SB01401	54860007	SO	SVOA	SW8270	DIETHYL PHTHALATE	41.7	JB	462	U	ug/kg	BL
54860	172SB01401	54860007	SO	VOA	SW8260	2-Chloroethyl vinyl ether	13.7	U	13.7	UJ	ug/kg	BS
54860	172SB01401	54860007	SO	SVOA	SW8270	2,4-DINITROPHENOL	2240	U	2240	UJ	ug/kg	CC
54860	172SB01402	54860001	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	27.1	JB	392	U	ug/kg	BL
54860	172SB01402	54860001	SO	SVOA	SW8270	DIETHYL PHTHALATE	33	JB	392	U	ug/kg	BL
54860	172SB01402	54860001	SO	SVOA	SW8270	2,4-DINITROPHENOL	1900	U	1900	UJ	ug/kg	CC
54860	172SB01402	54860001	SO	VOA	SW8260	1,2,3-Trichlorobenzene	5.2	U	5.2	UJ	ug/kg	MS
54860	172SB01402	54860001	SO	VOA	SW8260	1,2,4-TRICHLOROENZENE	5.2	U	5.2	UJ	ug/kg	MS
54860	172SB01402	54860001	SO	VOA	SW8260	1,2-DICHLOROENZENE	5.2	U	5.2	UJ	ug/kg	MS

Attachment 1 - Change Qualifiers and Results
Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
54860	172SB01402	54860001	SO	VOA	SW8260	1,3-DICHLOROENZENE	5.2	U	5.2	UJ	ug/kg	MS
54860	172SB01402	54860001	SO	VOA	SW8260	1,4-DICHLOROENZENE	0.29	J	0.29	J	ug/kg	MS
54860	172SB01402	54860001	SO	VOA	SW8260	STYRENE	5.2	U	5.2	UJ	ug/kg	MS
54860	172SB01402	54860001	SO	VOA	SW8260	Vinyl acetate	10.4	U	10.4	UJ	ug/kg	MS
54860	172SB01601	54860017	SO	VOA	SW8260	ACETONE	834	E	834	R	ug/kg	LR
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,1,1-TRICHLOROETHANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,1,2,2-TETRACHLOROETHANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,1,2-TRICHLOROETHANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,1-DICHLOROETHANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,1-DICHLOROETHENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,2,3-Trichlorobenzene	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,2,4-TRICHLOROENZENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,2-DICHLOROENZENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,2-DICHLOROETHANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,2-Dichloroethene (total)	64.2	DJ	64.2	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,2-DICHLOROPROPANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,3-DICHLOROENZENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	1,4-DICHLOROENZENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	2-BUTANONE	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	2-Chloroethyl vinyl ether	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	2-HEXANONE	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	4-METHYL-2-PENTANONE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	BENZENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	BROMODICHLOROMETHANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	BROMOFORM	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	BROMOMETHANE	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	CARBON DISULFIDE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	CARBON TETRACHLORIDE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	CHLOROENZENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	CHLOROETHANE	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	CHLOROFORM	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	CHLOROMETHANE	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	cis-1,2-DICHLOROETHYLENE	64.2	DJ	64.2	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	cis-1,3-DICHLOROPROPENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	DIBROMOCHLOROMETHANE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	ETHYLBENZENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	m+p Xylene	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	METHYLENE CHLORIDE	68.8	DJ	68.8	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	o-Xylene	500	U	500	R	ug/kg	DL

Attachment 1 - Changed Qualifiers and Results
Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
54860	172SB01601LR	54860017	SO	VOA	SW8260	STYRENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	TETRACHLOROETHYLENE(PCE)	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	TOLUENE	57.3	DJ	57.3	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	trans-1,2-DICHLOROETHENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	trans-1,3-DICHLOROPROPENE	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	TRICHLOROETHYLENE (TOE)	500	U	500	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	Vinyl acetate	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	VINYL CHLORIDE	1000	U	1000	R	ug/kg	DL
54860	172SB01601LR	54860017	SO	VOA	SW8260	XYLENES, TOTAL	500	U	500	R	ug/kg	DL
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2,4,5-TRICHLOROPHENOL	51	U	51	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2,4,6-TRICHLOROPHENOL	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2,4-DICHLOROPHENOL	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2,4-DIMETHYLPHENOL	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2,4-DINITROPHENOL	51	U	51	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2-CHLOROPHENOL	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2-METHYLPHENOL (o-CRESOL)	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	2-NITROPHENOL	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	3-Methylphenol/4-Methylphenol	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	4,6-DINITRO-2-METHYLPHENOL	51	U	51	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	4-CHLORO-3-METHYLPHENOL	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	4-NITROPHENOL	51	U	51	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	Benzoic acid	51	U	51	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	PENTACHLOROPHENOL	51	U	51	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	PHENOL	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1	54862001	WQ	SVOA	SW8270	PYRENE	10.2	U	10.2	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2,4,5-TRICHLOROPHENOL	50	U	50	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2,4,6-TRICHLOROPHENOL	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2,4-DICHLOROPHENOL	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2,4-DIMETHYLPHENOL	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2,4-DINITROPHENOL	50	U	50	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2-CHLOROPHENOL	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2-METHYLPHENOL (o-CRESOL)	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2-NITROPHENOL	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	3-Methylphenol/4-Methylphenol	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	4,6-DINITRO-2-METHYLPHENOL	50	U	50	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	4-CHLORO-3-METHYLPHENOL	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	4-NITROPHENOL	50	U	50	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	Benzoic acid	50	U	50	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	PENTACHLOROPHENOL	50	U	50	UJ	ug/L	HT

Attachment 1 - Changea Qualifiers and Results
Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	PHENOL	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	PYRENE	10	U	10	UJ	ug/L	HT
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	1,2,4-TRICHLOROBENZENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	1,2-DICHLOROBENZENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	1,3-DICHLOROBENZENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	1,4-DICHLOROBENZENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2,4-DINITROTOLUENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2,6-DINITROTOLUENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2-CHLORONAPHTHALENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2-METHYLNAPHTHALENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	2-NITROANILINE	50	U	50	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	3,3'-DICHLOROBENZIDINE	20	U	20	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	3-NITROANILINE	50	U	50	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	4-BROMOPHENYL PHENYL ETHER	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	4-CHLOROANILINE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	4-CHLOROPHENYL PHENYL ETHER	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	4-NITROANILINE	50	U	50	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	ACENAPHTHENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	ACENAPHTHYLENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	ANTHRACENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	BENZO(a)ANTHRACENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	BENZO(a)PYRENE	1	U	1	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	BENZO(b)FLUORANTHENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	BENZO(g,h,i)PERYLENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	BENZO(k)FLUORANTHENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	Benzyl alcohol	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	BENZYL BUTYL PHTHALATE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	bis(2-CHLOROETHOXY) METHANE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	bis(2-CHLOROETHYL) ETHER	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	Bis(2-Chloroisopropyl) Ether	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	CARBAZOLE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	CHRYSENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	DIBENZ(a,h)ANTHRACENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	DIBENZOFURAN	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	DIETHYL PHTHALATE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	DIMETHYL PHTHALATE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	DI-n-BUTYL PHTHALATE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	DI-n-OCTYLPHTHALATE	10	U	10	R	ug/L	RE

Attachment 1 - Changed Qualifiers and Results
Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	Diphenylamine	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	FLUORANTHENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	FLUORENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	HEXACHLOROBENZENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	HEXACHLOROBUTADIENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	HEXACHLOROCYCLOPENTADIENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	HEXACHLOROETHANE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	INDENO(1,2,3-c,d)PYRENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	ISOPHORONE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	NAPHTHALENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	NITROBENZENE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	N-NITROSODIPHENYLAMINE	10	U	10	R	ug/L	RE
54860W	172EB008M1LR	54862001	WQ	SVOA	SW8270	PHENANTHRENE	10	U	10	R	ug/L	RE
54860W	172GW001M1	54862003	WG	VOA	SW8260	Vinyl acetate	10	U	10	UJ	ug/L	CC, MS
54860W	172GW001M1	54862003	WG	VOA	SW8260	2-Chloroethyl vinyl ether	5	U	5	UJ	ug/L	MS
55050	172SB01201	55050001	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	41.8	JB	477	U	ug/kg	BL
55050	172SB01201	55050001	SO	SVOA	SW8270	DIETHYL PHTHALATE	44.1	JB	477	U	ug/kg	BL
55050	172SB01201	55050001	SO	SVOA	SW8270	PYRENE	477	U	477	UJ	ug/kg	CC
55050	172SB01201	55050001	SO	SVOA	SW8270	2,4-DINITROPHENOL	2310	U	2310	UJ	ug/kg	IC
55050	172SB01201	55050001	SO	SVOA	SW8270	NAPHTHALENE	477	U	477	UJ	ug/kg	IC
55050	172SB01202	55050002	SO	SVOA	SW8270	bis(2-ETHYLHEXYL) PHTHALATE	81.8	JB	442	U	ug/kg	BL
55050	172SB01202	55050002	SO	SVOA	SW8270	DIETHYL PHTHALATE	52.6	JB	442	U	ug/kg	BL
55050	172SB01202	55050002	SO	SVOA	SW8270	PYRENE	11.9	J	11.9	J	ug/kg	CC
55050	172SB01202	55050002	SO	SVOA	SW8270	2,4-DINITROPHENOL	2140	U	2140	UJ	ug/kg	IC
55050	172SB01202	55050002	SO	SVOA	SW8270	NAPHTHALENE	442	U	442	UJ	ug/kg	IC
56784	172GP00118	56784001	WG	VOA	SW8260B	ACETONE	7.4	J	10	U	ug/L	BL
56784	172GP00118	56784001	WG	VOA	SW8260B	METHYLENE CHLORIDE	3.2	J	5	U	ug/L	BL
56784	172GP00118	56784001	WG	VOA	SW8260B	Vinyl acetate	10	U	10	UJ	ug/L	CC
56784	172GP00118	56784001	WG	VOA	SW8260B	CHLOROMETHANE	10	U	10	UJ	ug/L	CC, MS
56784	172GP00118	56784001	WG	VOA	SW8260B	2-Chloroethyl vinyl ether	5	U	5	UJ	ug/L	MS
56784	172GP00218	56784002	WG	VOA	SW8260B	1,4-DICHLOROBENZENE	0.68	JB	5	U	ug/L	BL
56784	172GP00218	56784002	WG	VOA	SW8260B	ACETONE	17.2	=	17.2	U	ug/L	BL
56784	172GP00218	56784002	WG	VOA	SW8260B	METHYLENE CHLORIDE	3.5	J	5	U	ug/L	BL
56784	172GP00218	56784002	WG	VOA	SW8260B	CHLOROMETHANE	10	U	10	UJ	ug/L	CC
56784	172GP00218	56784002	WG	VOA	SW8260B	Vinyl acetate	10	U	10	UJ	ug/L	CC
56784	172GP00318	56784003	WG	VOA	SW8260B	ACETONE	4.8	J	10	U	ug/L	BL
56784	172GP00318	56784003	WG	VOA	SW8260B	METHYLENE CHLORIDE	2.6	J	5	U	ug/L	BL
56784	172GP00318	56784003	WG	VOA	SW8260B	CHLOROMETHANE	10	U	10	UJ	ug/L	CC
56784	172GP00318	56784003	WG	VOA	SW8260B	Vinyl acetate	10	U	10	UJ	ug/L	CC

Attachment 1 - Changed Qualifiers and Results
 Zone E - Data Validation

SDG	Sample ID	Lab Sample ID	Matrix	Parameter Class	Analytical Method	Parameter	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
56784	172HP00318	56784004	WG	VOA	SW8260B	1,4-DICHLOROBENZENE	0.15	JB	5	U	ug/L	BL
56784	172HP00318	56784004	WG	VOA	SW8260B	ACETONE	3.3	J	10	U	ug/L	BL
56784	172HP00318	56784004	WG	VOA	SW8260B	METHYLENE CHLORIDE	3.8	J	5	U	ug/L	BL
56784	172HP00318	56784004	WG	VOA	SW8260B	CHLOROMETHANE	10	U	10	UJ	ug/L	CC
56784	172HP00318	56784004	WG	VOA	SW8260B	Vinyl acetate	10	U	10	UJ	ug/L	CC

Well ID	VOA	Sample ID	Well ID	Compound	Count	Count	Concentration	Concentration	Unit
WQ	VOA	EB	SW8260B	METHYLENE CHLORIDE	1	1	3.8	3.8	ug/L
SO	VOA	FD	SW8260B	METHYLENE CHLORIDE	1	1	4	4	ug/kg
WQ	VOA	LB	SW8260B	METHYLENE CHLORIDE	3	2	2.4	2.4	ug/L
SO	VOA	N	SW8260B	METHYLENE CHLORIDE	18	16	0.85	3.6	ug/kg
WQ	VOA	TB	SW8260B	METHYLENE CHLORIDE	1	1	2.8	2.8	ug/L

EB = Equipment Blank
 FD = Field Duplicate
 LB = Laboratory Blank
 N = Native Sample
 TB = Trip Blank

CH2M Chain of Custody/ Laboratory Analysis Form

COC Tracking #: ZE172-012102-01 page 12

55057

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55050%

Laboratory: GEL	Site Name: Zone E, SWMU 172
Project Name: Charleston Navy Complex	Project Number: 158814.PM.04
TAT: Standard	QA Level: level 3
Project Manager: Tom Beisel	Address: GNV: 3011 SW Williston Rd., Gainesville, FL 32605
Address: ATL: 115 Perimeter Center Place NE, Suite 700, Atlanta, GA 30346-1278	Send Report To: see last page of COC
EDD: CNC format	

Lab Batch/SDG:

Sample ID	Station ID	Sample Description	Depth		Date & Time Collected	Matrix	# of containers	Analytes										Comments						
			Begin	End				Pesticides (SW8081)	Antimony (SW6010B)	Arsenic (SW6010B)	Chromium (SW6010B)	VOCs (SW8260B)	SVOCs (SW8270C)	Pesticides (SW8081)	Metals* (SW6010B)	VOCs (SW8260B)	SVOCs (SW8270C)							
172SB01201	E172SB012		0	1	1-23-02/1425	SO	5				X	X	X											
172SB01202	E172SB012		3	5	1-23-02/1435	SO	5				X	X	X											
																								RCRA Site
																								Sampling Complete

Sampled By: Andrew O'Conor	Date/Time: 1-23-02	Relinquished by: [Signature]	Date/Time: 1-23-02/1605
Additional Samplers: C. Diaz			
Received By Lab: [Signature]	Date/Time: 1/23/02 1605	Relinquished by:	Date/Time:

Receipt Exceptions: _____

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CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: ZE172-010702-01 page 1 of 3

Laboratory: GEL		Site Name: Zone E, SWMU 172																	
Project Name: Charleston Navy Complex		TAT: Standard																	
Project Number: 158814.PM.04		QA Level: level 3																	
Project Manager: Tom Beisel																			
Address: GNV: 3011 SW Williston Rd., Gainesville, FL 32605																			
Address: ATL: 115 Perimeter Center Place NE, Suite 700, Atlanta, GA 30346-1278																			
Send Report To: see last page of COC		EDD: CNC format																	
Sample ID	Station ID	Sample Description	Depth		Date & Time Collected	Matrix	# of containers	Lab Batch/SDG:								Comments			
			Begin	End				Pesticides (SW6081)	Antimony (SW6010B)	Arsenic (SW6010B)	Chromium (SW6010B)	VOCs (SW6260B)	SVOCs (SW6270C)	Pesticides (SW6081)	Metals* (SW6010B)		VOCs (SW6260B)	SVOCs (SW6270C)	
172SB00801 /	E172SB008-		0	1	1-18-02/ 0930	SO	2	X	X	X	X								
172SB00802 /	E172SB008		3	5	1-18-02/ 0945	SO	2	X	X	X	X								Sample
172SB00901 /	E172SB009		0	1	1-18-02/ 0950	SO	2	X	X	X	X								Job not
172SB00902 /	E172SB009		3	5	1-18-02/ 1000	SO	2	X	X	X	X								Complete
172SB01001 /	E172SB010		0	1	1-18-02/ 1010	SO	2	X	X	X	X								
172SB01002 /	E172SB010		3	5	1-18-02/ 1015	SO	2	X	X	X	X								
172CB01002 /	E172SB010		3	5	1-18-02/ 1016	SO	2	X	X	X	X								
172SB01101 /	E172SB011		0	1	1-18-02/ 1025	SO	5				X	X	X						
172SB01102 /	E172SB011		3	5	1-18-02/ 1035	SO	5				X	X	X						
172SB01201	E172SB012		0	1		SO					X	X	X						SB12 to
172SB01202	E172SB012		3	5		SO					X	X	X						be sampled
172SB01301 /	E172SB013		0	1	1-18-02/ 1045	SO	5				X	X	X						1-21-02
172CB01301 /	E172SB013		0	1	1-18-02/ 1050	SO	5				X	X	X						
172SB01302 /	E172SB013		3	5	1-18-02/ 1055	SO	5				X	X	X						
172SB01401 /	E172SB014		0	1	1-18-02/ 1110	SO	5				X	X	X						RCRA
172SB01402 /	E172SB014		3	5	1-18-02/ 1115	SO	5				X	X	X						
172SB01402MS	E172SB014	1120	3	5	1-18-02/ 1120	SO	5				X	X	X						MS
172SB01402SD	E172SB014		3	5	1-18-02/ 1125	SO	5				X	X	X						MSD
172SB01501	E172SB015		0	1	1-18-02/ 1135	SO	3				X								
172SB01502	E172SB015		3	5	1-18-02/ 1140	SO	3				X								

Sampled By: C. Bundy Date/Time: 1-18-02 Relinquished by: Chris Bluff Date/Time: 1-18-02/ 1530

Additional Samplers: C. Piez A. O'Connor

Received By Lab: Mike Tombo Date/Time: 1-18-02 1530 Relinquished by: _____ Date/Time: _____

Received By: _____ Date/Time: _____ Shipped Via: UPS FedEx Hand Other Tracking#: _____

Remarks: _____ Temperature: _____

Table F-1
SSL Calculation
Charleston Naval Complex
Zone E - SWMU 87

		Parameter	Chlorobenzene	Chloromethane	1,2-Dichloroethene	Trichloroethene	Tetrachloroethene	1,3-Dichlorobenzene	Methylene Chloride	Vinyl Chloride	Dieldrin
Chemical Specific Input Parameters											
C _w	= Target groundwater concentration MCL (mg/L)		1.00E-01	2.10E-03	7.00E-02	5.00E-03	5.00E-03	7.50E-02	5.00E-03	2.00E-03	4.30E-06
H	= Henry's Law Constant, dimensionless		1.82E-01	3.82E-01	1.79E-01	4.22E-01	7.54E-01	9.96E-03	8.98E-02	1.11E+00	6.19E-04
K _d	= Soil-water sorption coefficient (cm ³ water / g soil = L/kg) = K _{oc} x f _{oc} where		8.29E+00	5.18E-01	1.31E+00	3.49E+00	9.81E+00	2.29E+01	4.33E-01	6.88E-01	9.44E+02
	K _{oc} = organic carbon-water sorption coefficient, (cm ³ (ml) water) / (g soluble organic carbon)		2.24E+02	1.40E+01	3.55E+01	9.43E+01	2.89E+02	6.17E+02	1.17E+01	1.86E+01	2.55E+04
	f _{oc} = Fraction of organic content, dimensionless	0.037									
Site Specific Input Parameters											
S _w	= Width of Source Parallel to Groundwater Flow Direction (Impacted soil zone)	18.3 m	60 ft								
da	= Aquifer Thickness	7.0 m	23 ft								
d	= Groundwater Mixing Zone thickness	2.05 m	6.7 ft								
	(unpaved)	3.50 m	11.5 ft								
i	= Groundwater Gradient		3.2E-03 (unitless)								
K _s	= Saturated Hydraulic Conductivity	445.0 m/yr	1460.0 ft/yr								
θ _w	= Volumetric Water Content of Soil Pore Space	0.3 cm ³ _{vapor} /cm ³ _{soil}	0.3 in ³ _{vapor} /in ³ _{soil}								
θ _v	= Volumetric Vapor Content of Soil Pore Space	0.15 cm ³ _{vapor} /cm ³ _{soil}	0.15 in ³ _{vapor} /in ³ _{soil}								
ρ _s	= Soil Bulk Density	1.5 g/cm ³	93.64 lb _w /ft ³								
q _i	= Water Infiltration Rate	0.0066 m/yr	0.0263 ft/yr								
	(unpaved)	0.1372 m/yr	0.4500 ft/yr								
Partition Term, C _w /C _{soil} (L/kg)			8.50E+00	7.54E-01	1.53E+00	3.73E+00	1.01E+01	2.30E+01	6.42E-01	9.99E-01	9.44E+02
Dilution Term, dimensionless	(paved)	$\frac{C_{soil}}{C_w} = \left(\frac{\theta_w + K_d \rho_s + H \theta_v}{\rho_s} \right) \left(\frac{K_d i d + q_i S_w}{q_i S_w} \right)$	1.93E+01	1.93E+01	1.93E+01	1.93E+01	1.93E+01	1.93E+01	1.93E+01	1.93E+01	1.93E+01
	(unpaved)		2.97E+00	2.97E+00	2.97E+00	2.97E+00	2.97E+00	2.97E+00	2.97E+00	2.97E+00	2.97E+00
C _{soil} /C _w = Partition term * Dilution term (mg/kg / mg/L) = L/kg		(paved)	1.64E+02	1.46E+01	2.86E+01	7.20E+01	1.85E+02	4.46E+02	1.24E+01	1.93E+01	1.82E+04
	(unpaved)		2.53E+01	2.24E+00	4.55E+00	1.11E+01	3.00E+01	6.85E+01	1.91E+00	2.97E+00	2.81E+03
Calculated Site Specific Target Level for Soil											
C _{soil} calculated source soil concentration (SSL, mg/kg) C _w /(partition term)*(dilution term)		(paved)	16.4	0.031	2.07	0.36	0.97	33.34	0.06	0.04	0.08
	(unpaved)		2.53	0.0047	0.52	0.058	0.190	5.136	0.010	0.006	0.012

C_w is the MCL from EPA National Drinking Water Standards (March 2001) for US EPA Region III. RBCs (October, 2000). No MCL is available for 1,3-DCB; values used are for 1,4-DCB.

H from Table 36 of the Soil Screening Guidance; Technical Background Document (EPA, 1996) or from the Hazardous Substance Data Bank (electronic, 12/2002) adjusted to the dimensionless form (x 41).

K_d = K_{oc} x f_{oc}.

K_{oc} from Table 39 (42 for ionizing organics) of the Soil Screening Guidance; Technical Background Document (EPA, 1996).

f_{oc} calculated as the mean f_{oc} from TOC measurements from Zone E.

S_w is the estimated source area (60 ft).

d is calculated as d = (0.0112 L²/s²)^{0.5} * da * (1 - e^{-1.49 * (i/d)}) or da, whichever is less.

da is based on the groundwater elevation in the GIS (3 ft ms) - the top of Ashley elevation (-20 ft, GIS).

i is calculated from data in the GIS (12/2002, 1 ft/315 ft = 0.0032).

K_s Based on CH2MHill's hydraulic conductivity theme in the GIS (3 ft/d).

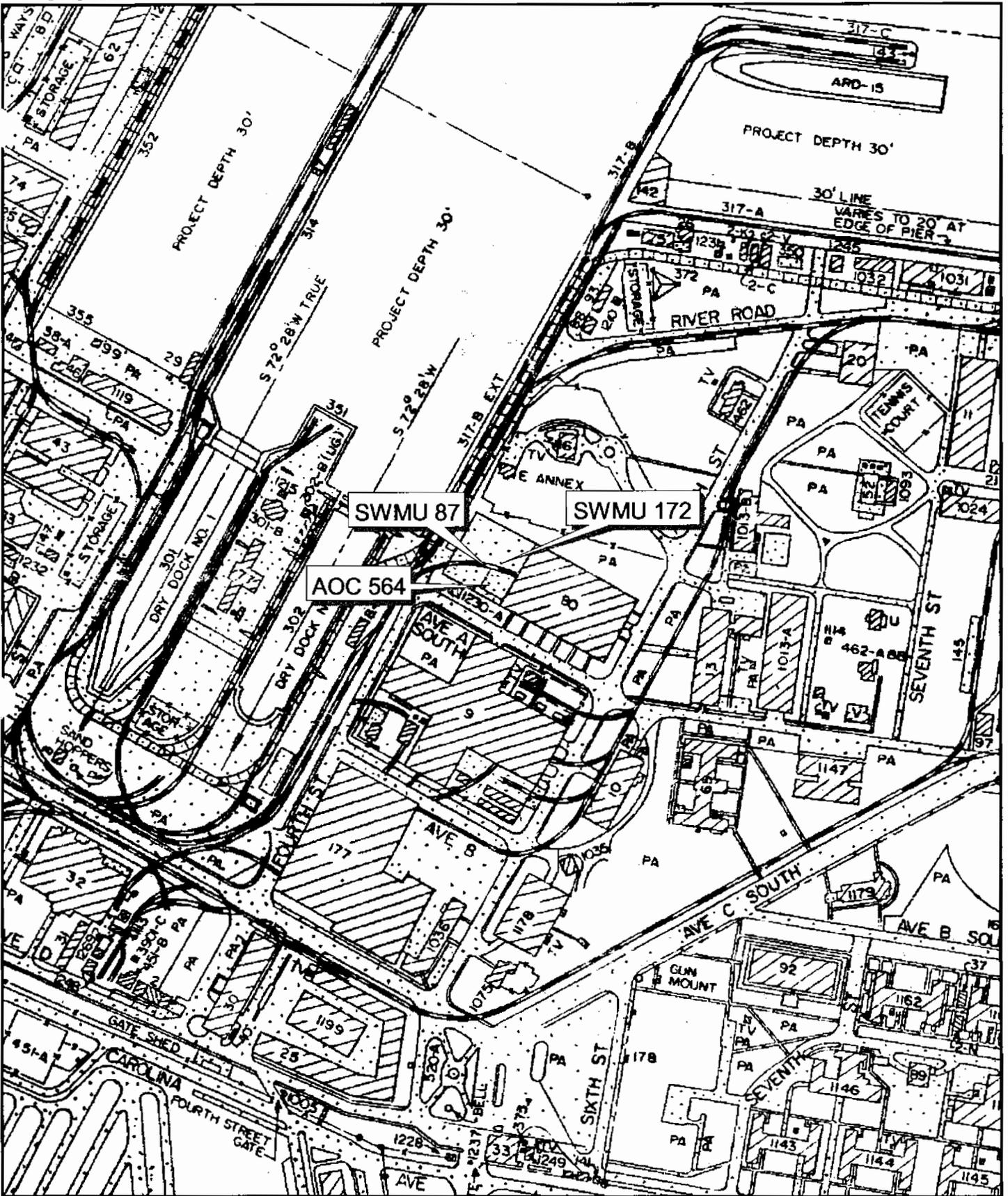
θ_w is the default value presented in the Soil Screening Guidance; User's Guide (EPA, 1996).

θ_v is calculated as total porosity (0.45, assumed) - θ_w (0.3) = 0.15.

ρ_s is the default value presented in the Soil Screening Guidance; User's Guide (EPA, 1996).

q_i is a derived value (5.4 in/yr) based on annual precipitation, evapo-transpiration, and runoff coefficient values for the Charleston area.

NOTE: Original figure created in color



— Railroad Tracks



Figure G-1
Historic Railroad Tracks - November 1955
Combined SWMU 87 Area
Charleston Naval Complex