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RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION REPORT ADDENDUM IM COMPLETION REPORT/CORRECTIVE MEASURES STUDY WORK PLAN SOLID WASTE MANAGEMENT UNIT 21 AND 54 ZONE E CNC CHARLESTON SC
7/16/2003
CH2M HILL

RFI REPORT ADDENDUM

RFI Report Addendum/IM Completion Report
CMS Work Plan - SWMUs 21 and 54, Zone E

Charleston Naval Complex
North Charleston, South Carolina

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

CH2M Jones

July 2003

Revision No. 1
Contract N62467-99-C-0960

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July 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/IM Completion Report/CMS Work Plan (Revision 1) – SWMUs 21 and 54, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum/IM Completion Report/CMS Work Plan (Revision 1 for SWMUs 21 and 54 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.

Please contact me at 352/335-5877, extension 2280, if you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

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May 9, 2003

Mr. David Scaturo
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2600 Bull Street
Columbia, SC 29201

Re: RFI Report Addendum/IM Completion Report/CMS Work Plan (Revision 0) – SWMUs 21 and 54 and AOCs 605 and 621, Zone E

Dear Mr. Scaturo:

Enclosed please find four copies of the RFI Report Addendum/IM Completion Report/CMS Work Plan (Revision 0) for SWMUs 21 and 54 and AOCs 605 and 621 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.

Please contact me at 352/335-5877, extension 2280, if you have any questions or comments.

Sincerely,

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Dean Williamson, P.E.

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

RFI REPORT ADDENDUM

RFI Report Addendum/IM Completion Report/ CMS Work Plan - SWMUs 21 and 54, Zone E

Charleston Naval Complex
North Charleston, South Carolina

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

PREPARED BY
CH2M-Jones

July 2003

Revision 1
Contract N62467-99-C-0960
158814.ZE.PR.25

Certification Page for RFI Report Addendum/IM Completion Report/CMS Work Plan (Revision 1) – SWMUs 21 and 54, 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

Permit No. 21428

Dean Williamson, P.E.

7/9/2003

Date

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B Analytical Data Summaries for Post-RFI Sampling (CH2M-Jones)

C Data Validation Report for Post-RFI Sampling (CH2M-Jones)

D SSL Calculations and SPLP Data

E Soil Boring Logs for Monitoring Wells E021GW001 and E021GW002

F Responses to Comment on the *Zone E RFI Report, Revision 0* (EnSafe, 1997)

G Copies of Waste Manifests for IM Field Activities

H Photographs of the IM Field Activities

I CH2M-Jones' Responses to SCDHEC Comments on the *RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Revision 0* (May 2003)

Acronyms and Abbreviations, Continued

OWS	oil/water separator
PCB	polychlorinated biphenyl
pg/L	picograms per liter
PPE	personal protective equipment
ppm	parts per million
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SCDHEC	South Carolina Department of Health and Environmental Control
SSL	soil screening level
SWMU	solid waste management unit
SVOC	semivolatile organic compound
TCDD	tetrachlorodibenzo-p-dioxin
TCLP	toxicity characteristic leaching procedure
TEQ	TCDD equivalent
TPH	total petroleum hydrocarbon
UST	underground storage tank
VOC	volatile organic compound
yd^3	cubic yards

Section 1.0

1.0 Introduction

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

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

1.1 Background for the RFI Report Addendum/IM Completion Report/CMS Work Plan

As part of the RCRA CA activities, a RCRA Facility Investigation (RFI) was conducted at Solid Waste Management Unit (SWMU) 21 and SWMU 54 in Zone E at the CNC (EnSafe Inc. [EnSafe], 1997). SWMUs 21 and 54 are located in the industrial area of Zone E between Roe Avenue and Cooper River. These sites were combined into one investigation area due to their close proximity and their potential for similar chemicals of potential concern (COPCs). Figure 1-1 illustrates the locations of the sites within the CNC. Figure 1-2 is an aerial photograph of the area.

SWMU 21, the Old Paint Storage Area, consists of a 20-foot (ft) by 180-ft concrete pad constructed in 1942 for welding operations. Beginning in 1973, the slab was used for storage of containerized paint wastes from ship repair and overhaul operations.

SWMU 54, the Former Abrasive Blasting Area, consists of the unpaved area around SWMU 21. The site was used for abrasive blasting of ship components and hull sections. Ship components, including anchor chains, were also painted in this area. SWMU 21 is located completely within the boundary of SWMU 54.

SWMUs 21 and 54 are recommended for an RFI in the current RCRA permit. The area where combined SWMUs 21 and 54 are located is zoned M-2, for heavy marine industrial use. The site is expected to be used for industrial (non-residential) purposes for the foreseeable future. Currently the site is not used for active operations.

1.2 Purpose of the RFI Report Addendum/IM Completion Report/CMS Work Plan

This RFI Report Addendum (RFIRA)/Interim Measure (IM) Completion Report (IMCR)/Corrective Measures Study (CMS) Work Plan (CMSWP) (RFIRA/IMCR/CMSWP) provides information regarding previous investigations and IMs at the site, in addition to additional investigation activities and a soil removal IM conducted by CH2M-Jones. The information presented herein includes the results of additional soil and groundwater sampling after the *Zone E RFI Report, Revision 0* (EnSafe, 1997) was completed, and the results of the two IMs.

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

- Status of the RFI
- Presence of metals (inorganics) in groundwater
- Potential linkage of SWMU/ AOC to SWMU 37 (investigated sanitary sewers)
- Potential linkage of SWMU/AOC to AOC 699 (investigated stormwater sewers)
- Potential linkage of SWMU/AOC to AOC 504 (investigated railroad lines)
- Potential migration pathways to surface water bodies (Zone J)
- Potential contamination associated with oil/water separators (OWSs)
- Relevance or need for land use controls (LUCs) at the site

Information regarding these issues is provided in this RFIRA/IMCR/CMSWP to expedite evaluation of the site.

1.3 Report Organization

This RFIRA/IMCR/CMSWP consists of the following sections, including this introductory section:

1.0 Introduction – Presents the purpose of the report and background information relating to the RFIRA/IMCR/CMSWP.

2.0 Summary of Previous Investigations at SWMUs 21 and 54– Summarizes the conclusions from the RFI and risk evaluations for SWMUs 21 and 54, as presented in the *Zone E RFI Report, Revision 0* (EnSafe, 1997).

3.0 Summary of Interim Measures at SWMUs 21 and 54– Provides information regarding the IMs conducted at the site during 1997 by the Environmental Detachment Charleston (DET) and in 2003 by CH2M-Jones.

4.0 Summary of Additional Investigations – Presents the details and summarizes the results of additional investigations conducted after completion of the RFI report.

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

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

7.0 Interim Measure Completion Report - Presents the details and results of the soil removal IM that was completed by CH2M-Jones in 2003.

8.0 Recommendations – Provides recommendations for proceeding with the RCRA CA process.

9.0 CMS Work Plan for SWMUs 21 and 54 - Presents a plan for conducting a CMS at SWMUs 21 and 54.

10.0 References – Lists the references used in this document.

Appendix A contains a copy of the *Completion Report: Interim/Stabilization Measure for SWMU 21 & SWMU 54, Naval Base Charleston, Charleston, SC* (DET, 1997).

Appendix B contains the analytical data summary tables for sampling conducted by CH2M-Jones following RFI activities.

Appendix C contains the data validation summary report for sampling conducted by CH2M-Jones following RFI activities.

Appendix D contains the results of synthetic precipitation leaching procedure (SPLP) tests and site-specific soil screening level (SSL) calculations for certain chemicals at the site.

Appendix E contains boring logs for the replaced monitoring wells E021GW001 and E021GW002.

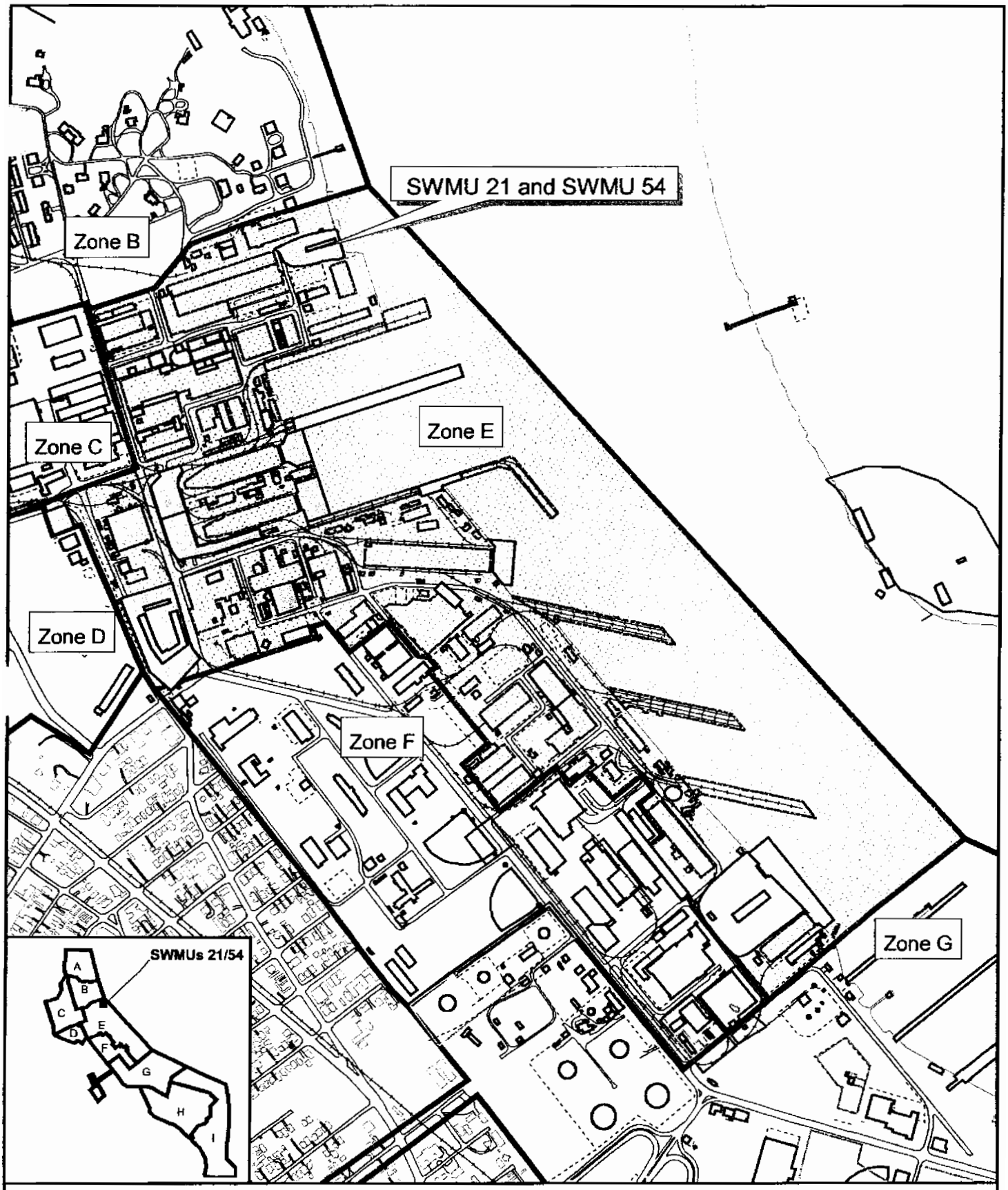
Appendix F contains responses to comments on the *Zone E RFI Report, Revision 0* (EnSafe, 1997).

Appendix G contains the waste manifests resulting from IM completion activities, as detailed in Section 7.0.

Appendix H contains selected photographs of the IM field activities at the site.

Appendix I contains CH2M-Jones' responses to SCDHEC comments on the *RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Revision 0* (May 2003).

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



Zone E Boundary
SWMU/AOC Within Zone E Boundary

N

0 800 1600 Feet

1 inch = 800 feet

Figure 1-1
Zone E Within CNC
SWMUs 21 and 54
Charleston Naval Complex

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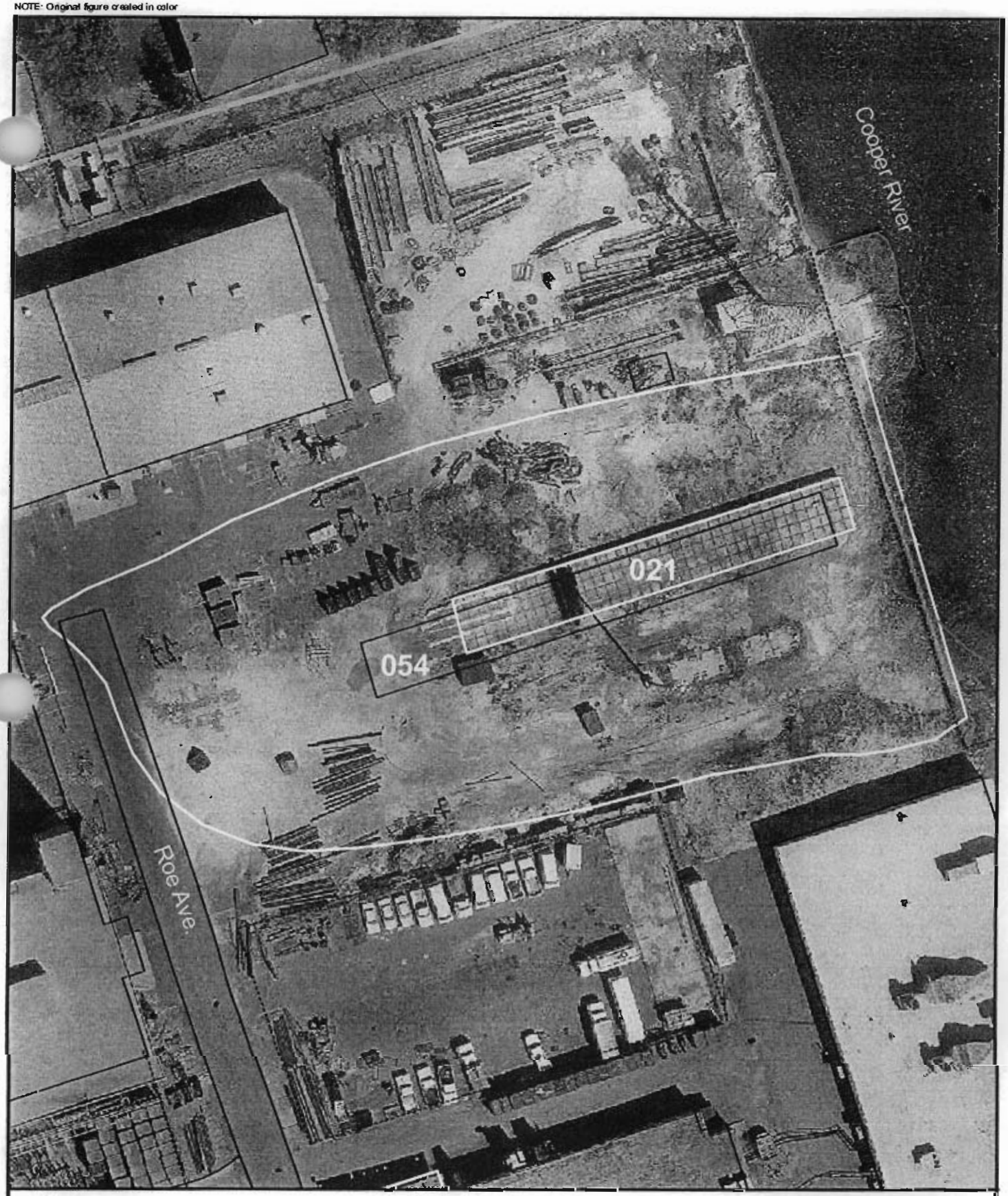
File Path: C:\18gis\Projects\Zone_E\newlocationfigs.apr, Date: 29 Apr 2003 14:41, User: NMOUDRY, SWMU 21 54 Figure 1-1 Zone E Within CNC

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



Roads
Shoreline
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

N

0 60 120 Feet

1 inch = 60 feet

Figure 1-2
Aerial Photograph of SWMUs 21 and 54
Site Map
Charleston Naval Complex

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File Path: C:\18gis\Projects\Zone_E\Swmu_21_Swmu_54\Aprs\Copyofswmu21and54figs.apr, Date: 29 Apr 2003 14:44, User: NMOUDRY, Figure 1-2 site map - SWMU 21 and 54

Section 2.0

2.0 Summary of Previous Investigations

2.1 Overview of Previous Investigations

A variety of investigations have been implemented at this site, beginning with the field investigation for interim status RCRA closure. A summary of the known investigations and IMs implemented at this site is presented in Table 2-1. The previous investigations at SWMUs 21 and 54 occurred in the following sequence:

1980s – Blast media and paint chips were sampled during an effort to obtain RCRA closure at SWMU 21. The samples were analyzed for extraction procedure (EP) toxicity characteristic. The RFA (EBASCO, 1987) for SWMU 21 reported that the waste from sandblasting operations had been determined to be non-hazardous based on the EP toxicity characteristic analytical results. A closure plan was reportedly prepared, and submitted to the SCDHEC by Environmental and Safety Designs (1985). The SWMU 54 RFA (EnSafe) reported that because surrounding soil and groundwater were not investigated, the RCRA Closure investigation was deemed incomplete.

In 1987 the RFA for SWMU 21 was performed (EBASCO, 1987). It concluded that wastes stored at SWMU 21 may contain cadmium, chromium, lead, cyanide, toluene, or tetrachloroethene (PCE).

1993 – In a preliminary phase before the RFI, nine surface soil samples, eight subsurface soil samples, and three sediment samples were collected in 1993. The samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and cyanide. Three shallow monitoring wells were also installed and sampled in 1993. The data from these sampling efforts were included in the RFI report for SWMUs 21 and 54.

1995 – The RFA for SWMU 54 was conducted in 1995 (EnSafe, 1995). It concluded that wastes at SWMU 54 have reportedly contained cadmium, chromium, lead, cyanide, toluene, and PCE. In addition, sandblasting residues were identified as containing organo-tin residues. The RFA also reported that the EP toxicity characteristic analytical results indicated that the paint chips previously collected did not exhibit the toxicity characteristic.

Soil samples were collected in 1995 at 40 soil sampling locations for the RFI; the results were presented and screened with the 1993 soil sample data in the RFI report. A detailed discussion of the RFI results is presented in Section 2.2. In addition, 25 shallow soil borings

were advanced to determine the thickness of the blast media at SWMU 54. It is not known precisely when these shallow soil borings were installed, but they were proposed in the *Zone E RFI Work Plan* (EnSafe/Allen & Hoshall, 1995) along with the other soil samples. The results were used as a basis for the subsequent IMs conducted for the Navy and the DET.

1996-1997 – Three additional shallow monitoring wells were installed and sampled at SWMUs 21 and 54. The three new wells and the three existing wells were sampled in April 1996. Three additional groundwater sampling events were performed in September 1996, December 1996, and February 1997. The last two sampling events included only two monitoring wells. Four of the six monitoring wells at SWMUs 21 and 54 were abandoned following the IM conducted by the DET. The first round of quarterly results were presented in the RFI report.

An IM was conducted by the DET in 1996, which included removal of visible blast media from surface soil across most of the site. Samples were not submitted for laboratory analysis. Samples were visually inspected to confirm that blast media was not present following the IM. As previously discussed, the IM activities included abandoning four monitoring wells at the site. The removed material was transported to offsite disposal facilities. The excavation was reportedly not backfilled. A copy of the IM completion report for this effort is included as Appendix A of this report.

2002 – CH2M-Jones continued soil and groundwater investigations to evaluate current surface soil conditions, to collect data for determination of site-specific SSLs, and to assess whether shallow groundwater has been impacted by site activities. Soil samples were later collected to delineate the extent of benzo[a]pyrene equivalent (BEQ)-impacted soil and to confirm the presence or absence of antimony and lead at concentrations that exceed groundwater protection levels in subsurface soil. An IM was conducted by CH2M-Jones to remove contaminated soil to a depth of 0 to 1 foot below land surface (ft bls). All removed material was transported to offsite disposal facilities. These efforts are described in further detail in this report.

2.2 RFI Sampling and Analysis

Soil, sediment and groundwater samples were collected at SWMU 21 and 54 as part of the Zone E RFI. Soil samples were analyzed for SVOCs, metals, and organotins. Nine duplicate samples were submitted for Appendix IX analysis. The RFI evaluation included nine surface and eight subsurface soil samples collected in 1993, which were were analyzed for VOCs, SVOCs, and metals.

Sediment samples were collected from within the tidal zone of the adjacent Cooper River. The results of the sediment analysis are being evaluated as part of the Zone J RFI effort by the Navy/EnSafe team.

Groundwater samples were analyzed for VOCs, SVOCs, metals, cyanide, polychlorinated biphenyls (PCBs), pesticides, chlorides, sulfates, total dissolved solids (TDS), and organotins. One duplicate sample was submitted for Appendix IX analysis.

2.2.1 Surface Soil Results

Forty surface samples were collected during the RFI. In addition, nine surface soil samples were collected during the pre-RFI investigation in 1993. The sampling locations are shown in Figure 2-1.

COPC screening criteria during the RFI for surface soil consisted of U.S. Environmental Protection Agency (EPA) Region III (June 1996) residential risk-based concentrations (RBCs) (hazard index [HI]=0.1 for non-carcinogens) for organics and inorganics, and Zone E background reference concentrations (BRCs) for inorganics. Analytical results from surface soil sampling were compared against these criteria with the following results:

VOCs

Five VOCs were detected in surface soil. No VOCs were detected above their respective industrial RBCs (HI=0.1).

SVOCs

Sixteen SVOCs were detected in surface soil. Benzo[a]pyrene and dibenz[a,h]anthracene exceeded their respective industrial RBC. Calculated BEQ concentrations exceeded the RBC in two samples.

Pesticides/PCBs

No pesticides or PCBs were detected.

Organotins

No organotins were detected.

TEQs

Nine duplicate surface soil samples collected during the RFI were analyzed for the Appendix IX suite, including dioxins. Dioxins were detected in all nine samples. Toxicity equivalent (TEQ) concentrations were all below the residential action level of 1,000

nanograms per kilogram (ng/kg) used as the screening criterion in the RFI report and the current dioxin residential RBC (4.3 ng/kg).

Metals

Arsenic, beryllium, and lead exceeded their industrial RBCs and Zone E BRCs in at least one surface soil sample. Arsenic was detected in one sample above its RBC and BRC. Nine samples contained beryllium at concentrations above its industrial RBC and BRC. Lead was detected above its industrial RBC and BRC in five samples.

The RFI concluded that arsenic, beryllium, and lead were present at concentrations above their respective industrial RBCs. Benzo[a]pyrene and dibenz[a,h]anthracene were noted to exceed their respective industrial RBCs in surface soil. Two samples had calculated BEQ values that exceeded the benzo[a]pyrene industrial RBC. These analytes were identified as COPCs based on an industrial land use scenario.

Following completion of the RFI, but prior to submission of the *Zone E RFI Report, Revision 0* (EnSafe, 1997), the DET conducted an IM at the site. The IM was intended to remove visible blast media from site soil. Figure A-1 in the IMCR (see Appendix A of this report) for this effort shows the area targeted for this IM. Excavation within the tidal zone was not performed. Based on the available information, it appears that all of the RFI surface soil sample locations were removed during the DET's IM.

2.2.2 Subsurface Soil Results

Thirty-five subsurface soil samples were collected during the RFI and eight subsurface soil samples were collected during the pre-RFI investigation. COPC screening criteria for subsurface soil consisted of generic SSLs (based on a dilution attenuation factor [DAF]=10) and, for inorganics, the Zone E BRCs. Inorganic chemical concentrations were compared with the higher of the BRC or SSL values. Analytical results from subsurface soil sampling were compared against these criteria with the following results:

VOCs

Three VOCs were detected in subsurface soil. No VOCs were detected above their respective SSLs.

SVOCs

Fifteen SVOCs were detected in subsurface soil samples. Seven SVOCs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were detected above their respective

SSLs. Benzo[a]anthracene was detected above its SSL in three samples (054SB02202, 054SB02702, and 054SB03102). Chrysene was detected above its SSL in two samples (054SB02202, and 054SB03102). The other five SVOCs were detected above their respective SSL in the same sample (054SB03102).

Benzo[a]anthracene and benzo[b]fluoranthene were detected in more than one sample at concentrations that exceeded their respective SSLs. BEQs were not detected in shallow groundwater and were not identified as COCs for subsurface soil.

Phenanthrene was detected marginally above its SSL in a single subsurface soil sample and was not detected in site groundwater. Phenanthrene was identified as a COC.

Pesticides/PCBs

No pesticides or PCBs were detected.

Organotins

No organotins were detected.

Metals

Twenty-four metals were detected in subsurface soil. Arsenic, barium, and cadmium exceeded their respective SSLs and BRCs. Three samples (054SB03102, 054SB03202, and 054SB03502) contained arsenic at concentrations that exceeded its SSL and BRC. Barium exceeded its SSL in five samples (054SB00302, 054SB03102, 054SB03202, 054SB03302, and 054SB03502). Cadmium exceeded its SSL in three samples (054SB00302, 054SB03102, and 054SB03502).

2.2.3 Groundwater Results

Three wells (E54GW001, E54GW002, and E54GW003) were installed and sampled during the RFI. Three wells installed during the pre-RFI investigation (E21GW001, E21GW002, and E21GW003) were also sampled during the RFI.

Analytical results from the first round of groundwater sampling were compared with the EPA Region III tap water RBCs and, for inorganics, the Zone E BRCs. Analytical results from groundwater sampling were compared against these criteria with the following results:

VOCs

No VOCs were detected above screening criteria in groundwater.

SVOCs

No SVOCs detected above screening criteria in groundwater.

Pesticides/PCBs

No pesticides or PCBs were detected.

Organotins

No organotins were detected.

No organophosphorous pesticides, dioxins, herbicides, or hexavalent chromium were detected.

Metals

Antimony, arsenic, iron, lead, and thallium exceeded their respective RBCs and BRCs. These analytes were identified as groundwater COPCs.

2.3 Human Health Risk Assessment (HHRA)

Section 10.2.8 of the *Zone E RFI Report, Revision 0* presents the fixed-point risk evaluation (FRE) conducted for SWMUs 21 and 54. Data collected in 1993 and during the RFI were used in the risk assessment. Groundwater data from the first round of RFI sampling were used to represent point risk/hazard for the groundwater risk assessment.

The FRE identified the following COCs for surface soil at SWMUs 21 and 54 based on 1993 and RFI data:

- **Unrestricted (i.e., Residential) Land Use Scenario** – Arsenic, BEQ, and beryllium.
- **Industrial Land Use Scenario** – arsenic, BEQ, and beryllium.

No subsurface soil COCs were identified.

The FRE identified the following COCs for shallow groundwater at SWMUs 21 and 54 based on first quarter sampling only:

- Antimony, arsenic, and thallium.

The RFI report recommended a CMS for soil and shallow groundwater at the site based on potential risks posed by the COCs identified above.

TABLE 2-1
Site Investigation and Remediation History
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Date	Media Investigated	Sample Stations	Reporting Document	Phase
Unknown	Blast Media, Paint Chips	Extraction Procedure (EP) Toxicity Characterization	Closure Plans for Interim Status Facilities, Environmental and Safety Designs, 1985	Field Investigation for Interim Status RCRA Closure
1987 (SWMU 21)	None	Visual Inspection	RFA, EBASCO, 1987	RFA
1993	Soil, Sediment, Groundwater	S21-B01 – 9 (soil) S21-S01 – 3 (sediment) CNSY-21-01 – 3	Final Zone E RFI Work Plan, EnSafe/Allen & Hoshall, 1995	Preliminary RFI Field Activities
1995 (SWMU 54)	None	Visual Inspection	Final RFA, EnSafe/Allen & Hoshall, 1995	RFA
October 1995	Soil, Sediment	E054SB001 – 40 E054MO001 – 4	Zone E RFI Report, EnSafe, Nov, 1997	RFI
April 1996	Groundwater	E021GW001 – 3 E054GW001 – 3	Zone E RFI Report, EnSafe, Nov, 1997	RFI
Unknown	Soil	054-T01 – T25 Blast Media Thickness Measurements	Interim/Stabilization Measure for SWMU 21 & SWMU 54, DET, 1997	RFI, IM
September 1996	Soil	Visual Confirmation of Blast Media Removal from Soil	Interim/Stabilization Measure for SWMU 21 & SWMU 54, DET, 1997	IM
September 1996	Groundwater	E021GW001 – 3 E054GW001 – 3	SWMUs 21 and 54 RFIRA, CH2M-Jones, May 2003	RFI
December 1996	Groundwater	E021GW003 E054GW002	SWMUs 21 and 54 RFIRA, CH2M-Jones, May 2003	RFI
February 1997	Groundwater	E021GW003 E054GW002	SWMUs 21 and 54 RFIRA, CH2M-Jones, May 2003	RFI

TABLE 2-1
Site Investigation and Remediation History
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Date	Media Investigated	Sample Stations	Reporting Document	Phase
September/ October 2002	Soil, Groundwater	E054SB041 – 47 E054SB048 – 51 (SPLP) E021GW001, 2, 4 E054GW002	SWMUs 21 and 54 RFIRA, CH2M-Jones, May 2003	RFI, IM
December 2002	Soil	E054SB052 – 59 E054VA001M3	SWMUs 21 and 54 RFIRA, CH2M-Jones, May 2003	IM
February 2003	Soil	E054VA001N2 Excavation	SWMUs 21 and 54 RFIRA, CH2M-Jones, May 2003	IM

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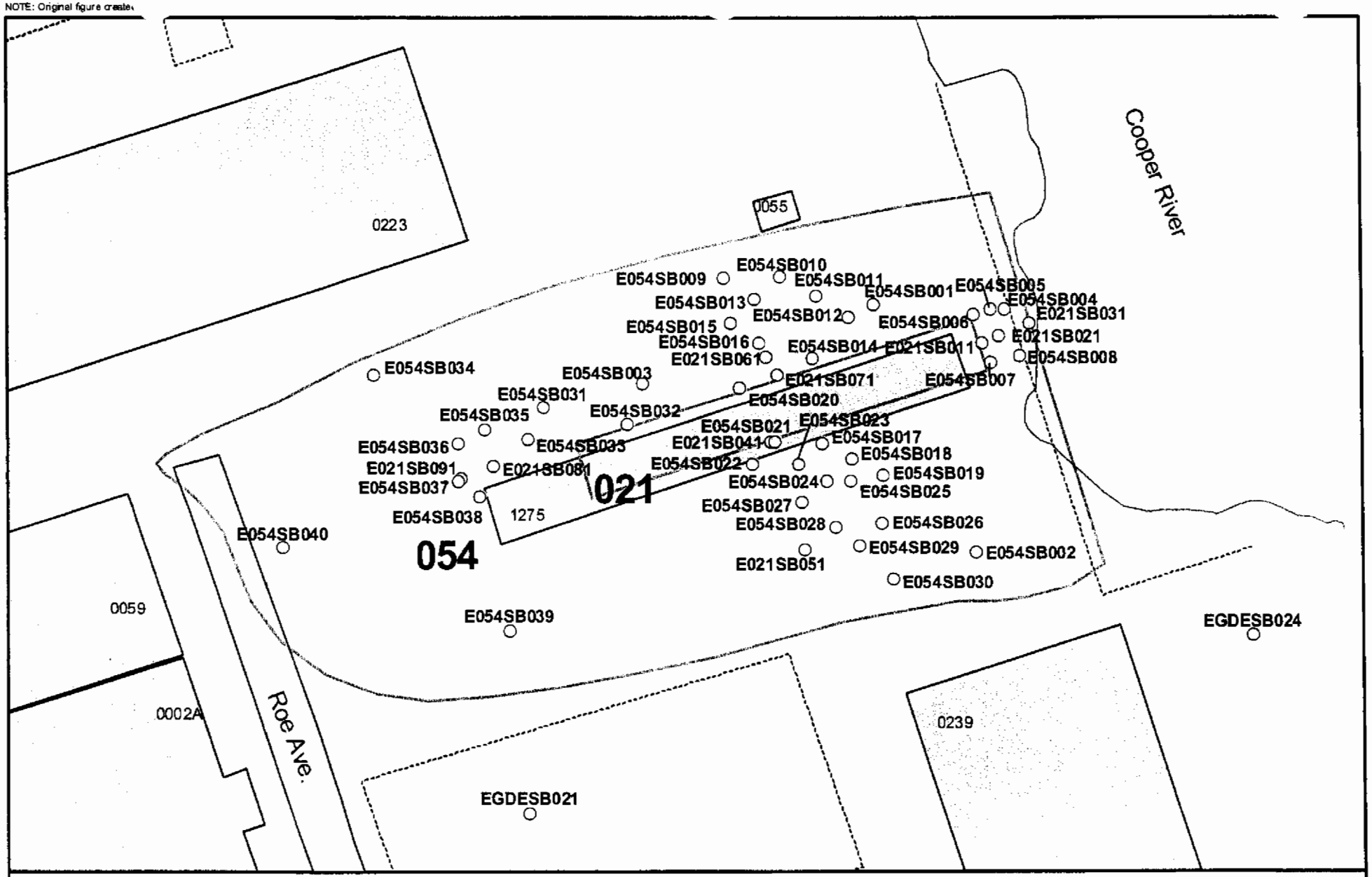

Soil Sample
Roads
Shoreline
SWMU Boundary
Buildings
Zone Boundary

N

0 60 120 Feet

1 inch = 60 feet

Figure 2-1
RFI Soil Sample Locations
SWMUs 21 and 54, Zone E
Charleston Naval Complex

CH2M HILL

File Path: C:\18gis\Projects\Zone_E\Swmu_21_Swmu_54\April\Copyofswmu21and54figs apr, Date: 10 Apr 2003 12:16, User: NMOUDRY, RFI Soil Sample Loactions - Figure 2-1 SWMU 21 and 54

NOTE: Aerial Photo Date is
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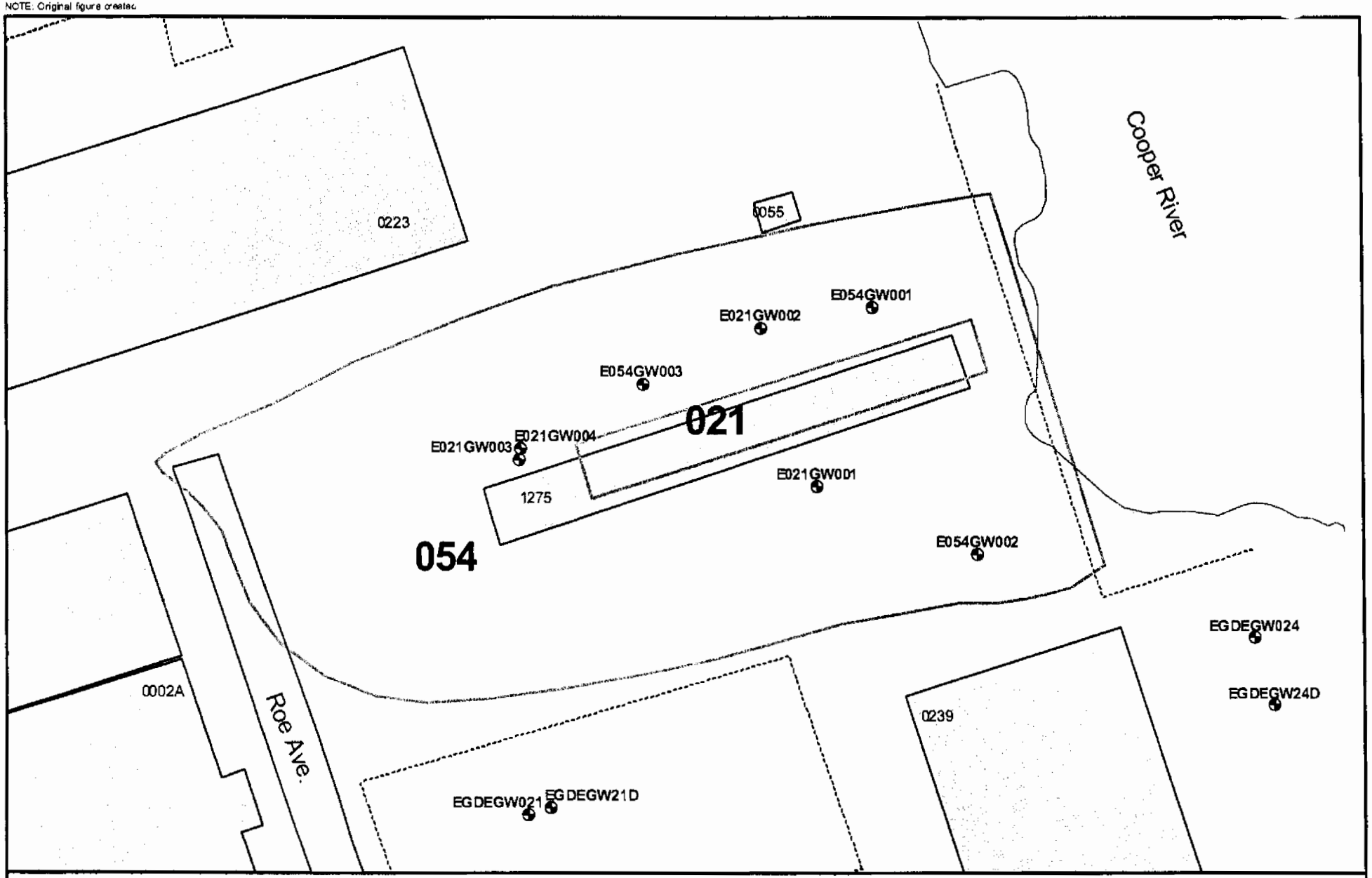

Monitoring Well
Roads
Shoreline
SWMU Boundary
Buildings
Zone Boundary

N

0 60 120 Feet

1 inch = 60 feet

Figure 2-2
RFI Groundwater Monitor Well Locations
SWMUs 21 and 54, Zone E
Charleston Naval Complex

CH2M HILL

File Path: C:\18gis\Projects\Zone_E\Swmu_21_Swmu_54\Aprs\Copyofswmu21and54figs.apr, Date: 28 Apr 2003 14:28, User: NMOUDRY, Figure 2-2 RFI Groundwater Monitoring Well Locations - SWMU 21 and 54

Section 3.0

3.0 Summary of UST/AST Removals and Interim Measures

This section summarizes information available regarding the status of underground storage tanks (UST) and aboveground tanks (ASTs) at the site, and any IM activities at the site.

3.1 USTs/ASTs

Neither the RFA nor the RFI reports refer to the presence or possible presence of any USTs or ASTs at SWMUs 21 and 54.

3.2 1996 Interim Measure

After the RFI report was issued , the Navy performed an IM at SWMUs 21 and 54 to remove blast media from surface and subsurface (up to 4 feet bls) soil at the site. The DET conducted the IM in 1996. Appendix A of this RFIRA/IMCR/CMSWP presents a copy of the IMCR for this activity. Figure A-1 of the IMCR (see Appendix A) shows the area targeted for this IM. Table A-1 of the IMCR indicates the measured thickness of the blast media at various locations within this area.

No excavation was performed in the marsh mud area adjacent to the Cooper River. No other modifications to the work plan were reported. The removal area included most of the SWMU 54 surface area and, to the extent practical, exposed soil containing blast media under or near the edge of the SWMU 21 concrete slab (Slab 1275).

During excavation activities, the DET discovered a vein of blast media parallel to the south side of Slab 1275. The DET removed the blast media from this area, which resulted in a trench approximately 4-ft wide, 4-ft deep and 130-ft long. Below the level of the blast media a compressed air pipe was encountered. The DET concluded that the pipe was likely installed sometime after blast operations began and surface material, consisting primarily of blast media, was used to fill the excavation trench.

Approximately 1,443.8 tons of non-hazardous waste and 18.6 tons of hazardous waste were removed from the site and disposed of. The site was graded, however the excavation was not backfilled.

3.3 2003 Interim Measure

A sampling and analysis plan (SAP) was developed by CH2M-Jones to evaluate the current risks associated with site soil. Based on the analytical results from these samples, it was determined that removal of a small area of BEQ-impacted soil was appropriate and an IM Work Plan (IMWP) was developed for the site.

From December 2002 to February 2003 , CH2M-Jones conducted pre-excavation delineation sampling and excavation of contaminated soil from SWMUs 21 and 54 in order to remove soil with concentrations of BEQs above the Media Cleanup Standard (MCS) of 1,304 micrograms per kilogram (μg/kg) for surface soil, as presented in the *Interim Measure Work Plan, SWMUs 21 and 54, Zone E, Revision 0* (CH2M-Jones, 2002b). The area excavated is shown on Figure 3-1. The results of these investigations are presented in Section 4.0, and details of the removal actions are presented in the IMCR presented in Section 7.0 of this RFIRA/IMCR/CMSWP.

At the conclusion of the 2003 IM, an evaluation of the data was conducted to assess whether BEQs were adequately removed and cleanup objectives had been achieved for surface soil to levels that would allow for industrial land use at this site (see Section 5.0). The results indicate that this objective was achieved.

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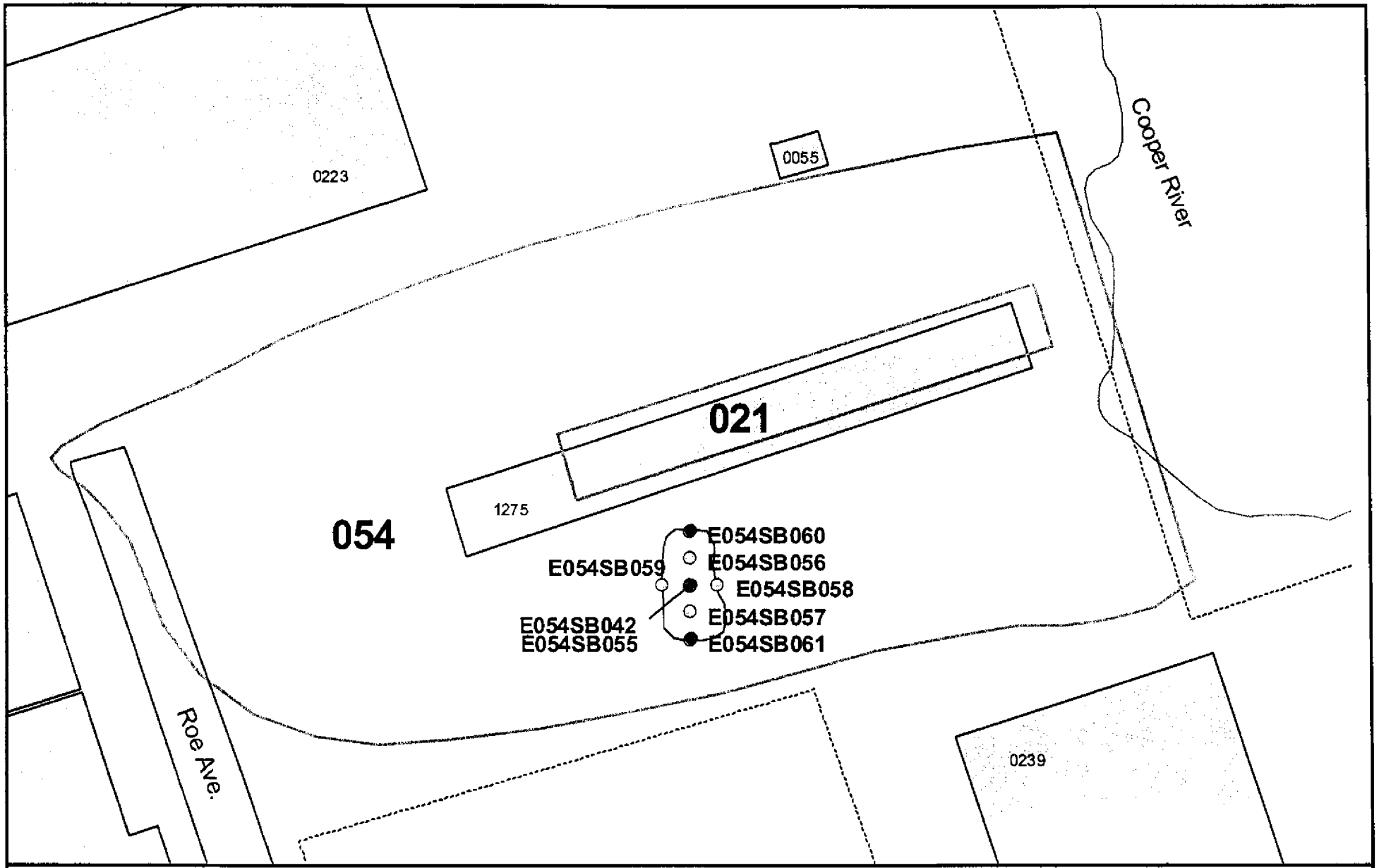


Previous Sample Locations
Proposed Sample Locations
Roads
Shoreline
SWMU Boundary
Buildings
Zone Boundary

N

0 60 120 Feet

1 inch = 50 feet

Figure 3-1
2003 Interim Measure Excavation Area
SWMUs 21 and 54, Zone E
Charleston Naval Complex

CH2M HILL

File Path: C:\18gis\Projects\Zone_E\Swmu_21_Swmu_54\Aprs\Copyofswmu21and54figs.apr, Date: 29 Apr 2003 14:12, User: NMOUDRY, Figure 3-1 2003 Figure 3-1Interim Measure Excavation Area - SWMU 21 and 54

Section 4.0

4.0 Summary of Additional Investigations

This section describes the investigations that were conducted at SWMUs 21 and 54 subsequent to the initial RFI. The soil and groundwater results conducted after completion of the *Zone E RFI Report, Revision 0* (EnSafe, 1997) are summarized and screened against applicable criteria. Appendix B contains the complete data summary tables and Appendix C contains the data validation summary.

In addition, groundwater results from the second, third, and fourth sampling events during the original RFI effort are presented and screened against current COPC criteria in this section, as these data were not originally screened in the *Zone E RFI Report, Revision 0*.

4.1 2002 and 2003 Soil Sampling

In August 2002, CH2M-Jones submitted a SAP for SWMUs 21 and 54. The South Carolina Department of Health and Environmental Control (SCDHEC) reviewed the SAP and issued comments on August 27, 2002. CH2M-Jones responded to SCDHEC's comments on September 5, 2002.

The objective of the SAP was to collect surface soil samples to characterize existing surface soil conditions (because surface soil had been removed during the DET's IM), and SPLP samples (to calculate site-specific SSLs), as well as to collect filtered and unfiltered groundwater samples (to determine if a relationship between metals concentrations and suspended solids exists). Eight surface soil samples were collected and analyzed for metals, VOCs, and SVOCs. Four surface soil samples were also collected to evaluate the leaching potential (SPLP) of select metals (antimony, lead, mercury, and thallium).

The sample locations are shown in Figure 4-1.The sampling locations were distributed across the site to allow evaluation of current surface soil conditions. The SPLP samples collected included surface and subsurface samples.

In addition to these samples, additional soil samples were collected to assist in delineating the extent of BEQ-impacted soil for a soil removal IM, as previously discussed in Section 3.0. A total of ten delineation samples were collected prior to the IM. The first round (December 2002) included four subsurface (E54SB052 through E54SB055 [E54SB055 was a 1 to 2 ft bls sample at E54SB042) and four surface samples around E54SB042 (E54SB056 through E54SB059). The second round (January 2003) included two surface samples (E54SB060 and

E54SB061). The second round samples were collected to complete the delineation around E54SB042. The results from this delineation sampling are also discussed in this section.

4.1.1 Surface Soil Results

Surface soil analytical results were compared to industrial RBCs (HI=0.1), SSLs (DAF=10), and the range of background concentrations (for inorganics). BEQ values were compared to the CNC sitewide reference concentration. Compounds that exceeded screening criteria were considered COPCs and are further evaluated in Section 5.0.

Detected chemicals in these surface soil samples are summarized in Tables 4-1 (inorganics) and 4-2 (organics). The additional surface soil sampling yielded the following results:

- Lead marginally exceeded its target cleanup level of 1,218 mg/kg for industrial use in a single sample (054SB052, 1,230 mg/kg). Antimony, lead, and mercury were also detected at concentrations above their respective SSLs and ranges of background concentrations. Based on these data, antimony, lead, and mercury were identified as surface soil COPCs.

- Benzo[a]pyrene and benzo[b]fluoranthene exceeded their respective industrial RBCs in one sample (054SB042). Benzo[a]anthracene, benzo[a]pyrene, and benzo[b]fluoranthene were detected in surface soil samples at concentrations above their individual generic SSLs. Three samples (054SB04201, 054SB05601, and 054SB05701) had calculated BEQ values that exceeded the CNC sitewide reference concentration of 1,304 μg/kg. Based on these results, BEQs were identified as surface soil COPCs.

4.1.2 Subsurface Soil Results

Four subsurface soil samples were collected to calculate site-specific SSLs for select metals (antimony, lead, mercury, and thallium) and four additional subsurface soil samples were collected to confirm and delineate SVOCs in subsurface soil. Detected chemicals in these samples are presented in Tables 4-3 (inorganics) and 4-4 (organics). Sample locations are shown in Figure 4-1.

These samples yielded the following results:

- Antimony and lead were detected in the same sample (054SB04802) at concentrations above their respective generic SSLs (DAF=10). These metals were identified as subsurface soil COPCs.

- Benzo[a]anthracene and benzo[b]fluoranthene, were detected in subsurface soil samples (054SB05302 and 054SB05503) at concentrations above their individual generic SSLs. These two samples had calculated BEQ values that exceeded the CNC sitewide reference concentration of 1,400 $\mu g/kg$. Based on these results, BEQs were identified as subsurface soil COPCs.

4.2 Groundwater Sampling and Analysis

The *Zone E RFI Report, Revision 0* screened data from the first round of groundwater samples collected at the site. All four rounds of groundwater samples had been collected and validated in Appendix H of the RFI report, however the report included discussion only of the first round. This section screens the remainder of the RFI groundwater samples against current COPC screening criteria. In addition, groundwater samples collected after completion of the original RFI effort are also presented and discussed.

4.2.1 RFI Groundwater Results (1996 and 1997)

In August 1996 monitoring wells E021GW001, E021GW002, E021GW003, E054GW001, E054GW002, and E054GW003 were sampled and analyzed for chloride, sulfate, TDS, metals, and VOCs. Following collection of these samples, four of the six site monitoring wells (E021GW001, E021GW002, E054GW001, and E054GW003) were damaged during an IM conducted by the DET and subsequently abandoned.

In December 1996 and February 1997, the remaining two monitoring wells were sampled. All four samples were analyzed for metals. The December 1996 samples and the sample collected from monitoring well E021GW003 in February 1997 were also analyzed for total TDS, chloride, and sulfate.

The detected analytes for these groundwater samples are presented in Table 4-5. The results of the COPC screening are summarized as follows:

- Antimony, iron, manganese, and nickel were detected at concentrations above their respective Maximum Contaminant Level (MCL) or EPA Region III tap water RBC (in the absence of a MCL). Iron and manganese were not detected above their respective range of background concentrations.

- Antimony was detected above its MCL in the February 1997 sample collected from monitoring well E054GW002. Antimony concentrations had been previously reported above the MCL in this well and in well E021GW002 in the first round of RFI

groundwater samples. Based on these results, antimony is identified as a groundwater COPC.

- Nickel was detected above its tap water RBC (HI=0.1) in the sample collected from monitoring well E054GW002 in December 1996. Based on these results, nickel is identified as a groundwater COPC.

4.2.2 CH2M-Jones Groundwater Results (2002)

In May 2002, CH2M-Jones measured water levels in select monitoring wells at the CNC. These data were used to determine groundwater flow characteristics. Figure 4-2 presents the shallow groundwater contours for SWMUs 21 and 54 and the surrounding area.

Two of the monitoring wells abandoned after the DET's IM (E021GW001 and E021GW002) were replaced. The boring logs for the replacement wells (E021GW001 and E021GW002) are provided in Appendix E.

The SAP developed by CH2M-Jones in August 2002 specified sampling the two replacement monitoring wells and the two existing wells. Monitoring well E021GW003, which was not identified as having been abandoned, could not be located by the field team. Monitoring well E021GW004, which is within approximately 5 feet of the former location E021GW003, was sampled in place of E021GW003.

The SAP called for a filtered sample and an unfiltered sample to be collected from each monitoring well to evaluate the possible impact of suspended solids on the analytical results. The filtered samples were intended to be filtered in the field, however, the filtered samples were collected unfiltered and subsequently filtered in the laboratory. The analytical results for the groundwater samples are presented in Table 4-6.

Two groundwater samples were collected in December 2002 and analyzed for polycyclic aromatic hydrocarbons (PAHs). Detected concentrations of SVOCs for these samples are presented in Table 4-7.

Analytical results from these samples were compared to MCLs (or tap water RBCs in the absence of an MCL) and, for inorganics, the Zone E range of background concentrations. The results of this screening are presented below:

- Antimony, iron, lead, manganese, and thallium were detected at concentrations that exceeded their respective MCLs, or RBCs (in the absence of a MCL) in the unfiltered samples.

- Antimony was detected in a single groundwater sample in well E054GW002. The detected concentration exceeded its MCL and range of background concentrations in both the unfiltered and filtered samples. Therefore, antimony was identified as a groundwater COPC.

- Iron was detected above its RBC (HI=0.1) in all four unfiltered groundwater samples. Iron was marginally above its RBC in one filtered sample. All reported iron concentrations were within the Zone E range of background concentrations. Because iron is considered an essential nutrient and detected concentrations were all within the range of background concentrations, iron was not identified as a groundwater COPC.

- Lead was detected in two unfiltered groundwater samples. One unfiltered sample from well 054GW002 contained lead above its MCL. Lead was not detected in any of the filtered samples. Because lead was detected above screening criteria, it was identified as a groundwater COPC.

- Manganese was detected above its RBC (HI=0.1) in all eight filtered and unfiltered samples. All reported manganese concentrations were within the Zone E range of background concentrations. Because detected manganese concentrations were all within the range of background concentrations, manganese was not identified as a groundwater COPC.

- Thallium was detected in a single groundwater sample collected from well E021GW001. The detected concentration exceeded its MCL and range of background concentrations in both the unfiltered and filtered sample. Because thallium was detected above screening criteria, it was identified as a groundwater COPC.

- No SVOCs were detected above their respective RBCs.

4.3 Leachability Evaluation of Selected Metals

In order to assess the leachability of antimony, lead, mercury, and thallium from soil, SPLP analyses were performed on soil samples collected from SWMU 21/54, as previously described. The results of the SPLP tests and site-specific SSL calculations are presented in Appendix D. A site-specific SSL using this approach could not be calculated for thallium because thallium was not detected in any of the soil samples collected for SPLP analysis. Based on this evaluation, the following site-specific SSLs were calculated for the metals under the unpaved land use scenario:

Metal	SSL (mg/kg)
Antimony	6.6
Lead	616
Mercury	13

These SSL values are used in the COPC/COC refinement discussion presented in Section 5.0 of this RFIRA/IMCR/CMSWP.

4.4 COPC Summary

As a result of the additional sampling and analysis performed, lead, antimony, mercury, and BEQs were identified as COPCs in site surface soil. Antimony, lead, and BEQs were identified as COPCs in subsurface soil. Antimony, lead, nickel, and thallium were identified as groundwater COPCs. These chemicals are further discussed in Section 5.0.

TABLE 4-1
Inorganics Detected in Surface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (mg/kg)	Qualifier	Industrial RBC[a] (HI=0.1)	SSL[b] (DAF=10)	Range of Background Concentrations
Chromium, Total	E054SB045	054SB04501	09/17/02	117	=	3.10E+05	19	2.3 - 567
	E054SB046	054SB04601	09/17/02	17.8	=			
	E054SB047	054SB04701	09/17/02	12.5	=			
	E054SB052	054SB05201	09/17/02	123	=			
Cobalt	E054SB041	054SB04101	09/17/02	4.11	J	1.20E+04	NA	0.35 - 111
	E054SB042	054SB04201	09/17/02	2.79	J			
	E054SB043	054SB04301	09/17/02	1.71	J			
	E054SB044	054SB04401	09/17/02	0.619	J			
	E054SB045	054SB04501	09/17/02	11.4	=			
	E054SB046	054SB04601	09/17/02	1.66	J			
	E054SB047	054SB04701	09/17/02	2.01	J			
	E054SB052	054SB05201	09/17/02	1.98	J			
Copper	E054SB041	054SB04101	09/17/02	253	J	8.20E+03	NA	0.47 - 866
	E054SB042	054SB04201	09/17/02	36.1	J			
	E054SB043	054SB04301	09/17/02	84.9	J			
	E054SB044	054SB04401	09/17/02	1.92	J			
	E054SB045	054SB04501	09/17/02	523	J			
	E054SB046	054SB04601	09/17/02	25.3	J			
	E054SB047	054SB04701	09/17/02	31	J			
	E054SB052	054SB05201	09/17/02	226	J			
Iron	E054SB041	054SB04101	09/17/02	16,800	J	6.10E+04	NA/EN	1,050 - 30,600
	E054SB042	054SB04201	09/17/02	13,100	J			
	E054SB043	054SB04301	09/17/02	10,300	J			
	E054SB044	054SB04401	09/17/02	12,500	J			
	E054SB045	054SB04501	09/17/02	27,300	J			
	E054SB046	054SB04601	09/17/02	8,120	J			
	E054SB047	054SB04701	09/17/02	4,850	J			
	E054SB052	054SB05201	09/17/02	10,300	J			

TABLE 4-1
Inorganics Detected in Surface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (mg/kg)	Qualifier	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations
Potassium	E054SB047	054SB04701	09/17/02	262	J	NA/EN	NA/EN	46 - 2,620
	E054SB052	054SB05201	09/17/02	237	J			
Selenium	E054SB041	054SB04101	09/17/02	1.05	J	1.00E+03	2.5	0.57 - 4.0
	E054SB042	054SB04201	09/17/02	1.07	J			
	E054SB043	054SB04301	09/17/02	0.502	J			
	E054SB044	054SB04401	09/17/02	0.926	J			
	E054SB045	054SB04501	09/17/02	1.71	=			
	E054SB047	054SB04701	09/17/02	0.339	J			
	E054SB052	054SB05201	09/17/02	0.695	J			
Silver	E054SB041	054SB04101	09/17/02	0.826	J	1.00E+03	17	0.75 - 0.91
	E054SB045	054SB04501	09/17/02	0.575	J			
Sodium	E054SB041	054SB04101	09/17/02	73.8	J	NA/EN	NA/EN	12 - 28,200
	E054SB042	054SB04201	09/17/02	94.8	J			
	E054SB043	054SB04301	09/17/02	883	J			
	E054SB044	054SB04401	09/17/02	1130	J			
	E054SB045	054SB04501	09/17/02	813	J			
	E054SB046	054SB04601	09/17/02	95.1	J			
	E054SB047	054SB04701	09/17/02	60.5	J			
	E054SB052	054SB05201	09/17/02	34.3	J			
Vanadium	E054SB041	054SB04101	09/17/02	10.7	J	1.40E+03	3000	1.1 - 60
	E054SB042	054SB04201	09/17/02	17.2	=			
	E054SB043	054SB04301	09/17/02	16.1	=			
	E054SB044	054SB04401	09/17/02	19.2	=			
	E054SB045	054SB04501	09/17/02	12.3	=			
	E054SB046	054SB04601	09/17/02	13.3	=			
	E054SB047	054SB04701	09/17/02	11.5	=			
	E054SB052	054SB05201	09/17/02	9.52	J			
Zinc	E054SB041	054SB04101	09/17/02	1,050	=	6.10E+04	6,000	1.9 - 855

TABLE 4-1
Inorganics Detected in Surface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (mg/kg)	Qualifier	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations
Zinc	E054SB042	054SB04201	09/17/02	133	=	6.10E+04	6,000	1.9 - 855
	E054SB043	054SB04301	09/17/02	177	=			
	E054SB044	054SB04401	09/17/02	11.9	=			
	E054SB045	054SB04501	09/17/02	2,990	=			
	E054SB046	054SB04601	09/17/02	97.6	=			
	E054SB047	054SB04701	09/17/02	189	=			
	E054SB052	054SB05201	09/17/02	1,100	=			

[a] Listed risk based concentrations (RBCs) for non-carcinogenic compounds are based on a hazard index (HI) of 0.1.
[b] Listed soil screening levels (SSLs) are based on a dilution-attenuation factor (DAF) of 10.
[c] indicates that the compound is classified as a carcinogen.

[d] Adult Lead Methodology (ALM) Derived Target Lead Concentration for Industrial Land Use (CH2M Hill November 9, 2002).
J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.
SPLP indicates that the sample was collected for synthetic precipitation leaching procedure (SPLP) analysis.
NA indicates that the information is not available or not applicable.
EN indicates that the chemical is an essential nutrient.

TABLE 4-2
Organics Detected in Surface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical Group	Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/kg)	Qualifier	Industrial RBC[a] (HI=0.1)	SSL[b] (DAF=10)	Sitewide Reference Concentrations[c]
	Fluoranthene	E054SB052	054SB05201	09/17/02	3630	=	8.20E+06	2.15E+06	NA
		E054SB056	054SB05601	12/20/02	458	=			
		E054SB057	054SB05701	12/20/02	3,440	=			
		E054SB058	054SB05801	12/20/02	389	=			
		E054SB059	054SB05901	12/20/02	491	=			
		E054SB060	054SB06001	01/23/03	142	=			
		E054SB061	054SB06101	01/23/03	1,520	=			
	Fluorene	E054SB041	054SB04101	09/17/02	21.3	J	8.20E+06	2.80E+05	NA
		E054SB056	054SB05601	12/20/02	7	J			
		E054SB057	054SB05701	12/20/02	15.5	J			
		E054SB061	054SB06101	01/23/03	32	J			
	Indeno(1,2,3-c,d)pyrene [ca]	E054SB041	054SB04101	09/17/02	288	J	7.80E+03	7.00E+03	525
		E054SB042	054SB04201	09/17/02	4,030	=			
		E054SB052	054SB05201	09/17/02	294	J			
		E054SB056	054SB05601	12/20/02	595	J			
		E054SB057	054SB05701	12/20/02	381	J			
		E054SB058	054SB05801	12/20/02	65.2	=			
		E054SB059	054SB05901	12/20/02	190	=			
		E054SB060	054SB06001	01/23/03	89.5	=			
		E054SB061	054SB06101	01/23/03	293	=			
	Phenanthrene	E054SB041	054SB04101	09/17/02	345	J	6.10E+07	6.00E+06	NA
		E054SB042	054SB04201	09/17/02	6,200	=			
		E054SB043	054SB04301	09/17/02	40.4	J			
		E054SB045	054SB04501	09/17/02	37.6	J			
		E054SB052	054SB05201	09/17/02	776	J			
		E054SB056	054SB05601	12/20/02	33	J			
		E054SB057	054SB05701	12/20/02	707	=			

TABLE 4-2
Organics Detected in Surface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical Group	Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/kg)	Qualifier	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Sitewide Reference Concentrations[c]
	Phenanthrene	E054SB058	054SB05801	12/20/02	158	=	6.10E+07	6.00E+06	NA
		E054SB059	054SB05901	12/20/02	159	=			
		E054SB060	054SB06001	01/23/03	26	J			
		E054SB061	054SB06101	01/23/03	1,140	=			
	Pyrene	E054SB041	054SB04101	09/17/02	570	J	6.10E+06	2.10E+06	NA
		E054SB042	054SB04201	09/17/02	13,600	=			
		E054SB043	054SB04301	09/17/02	83.3	J			
		E054SB045	054SB04501	09/17/02	82	J			
		E054SB046	054SB04601	09/17/02	29.4	J			
		E054SB052	054SB05201	09/17/02	2,880	=			
		E054SB056	054SB05601	12/20/02	1,420	J			
		E054SB057	054SB05701DL	12/20/02	4,440	=			
		E054SB058	054SB05801	12/20/02	486	=			
		E054SB059	054SB05901	12/20/02	741	=			
		E054SB060	054SB06001	01/23/03	229	=			
		E054SB061	054SB06101	01/23/03	1,650	=			
	BEQ	E054SB041	054SB04101	09/17/02	603	J	NA	NA	1,304
		E054SB042	054SB04201	09/17/02	**12,095**	J			
		E054SB043	054SB04301	09/17/02	311	J			
		E054SB044	054SB04401	09/17/02	451	U			
		E054SB045	054SB04501	09/17/02	285	J			
		E054SB046	054SB04601	09/17/02	246	J			
		E054SB047	054SB04701	09/17/02	434	U			
		E054SB052	054SB05201	09/17/02	1,150	J			
		E054SB056	054SB05601	12/20/02	**1,648**	J			
		E054SB057	054SB05701	12/20/02	**1,388**	J			

TABLE 4-2
Organics Detected in Surface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical Group	Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/kg)	Qualifier	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Sitewide Reference Concentrations[c]
	BEQ	E054SB058	054SB05801	12/20/02	226	J			
		E054SB059	054SB05901	12/20/02	572	J	NA	NA	1,304
		E054SB060	054SB06001	01/23/03	188	J			
		E054SB061	054SB06101	01/23/03	990	J			

[a] Listed risk based concentrations (RBCs) for non-carcinogenic compounds are based on a hazard index (HI) of 0.1.
[b] Listed soil screening levels (SSLs) are based on a dilution-attenuation factor (DAF) of 1 for VOCs and 10 for other compounds.
[c] Background PAHs Study Report, Technical Information for Development of Background BEQ Values (CH2M-Jones, 2001).
[ca] indicates that the compound is classified as a carcinogen.

SPLP indicates that the sample was collected for synthetic precipitation leaching procedure (SPLP) analysis.
J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.
NA indicates that the information is not available or not applicable.
EN indicates that the chemical is an essential nutrient.

TABLE 4-3
Inorganics Detected in Subsurface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (mg/kg)	Qualifier	SSL [a] (DAF=10)	Range of Background Concentrations[b]
Antimony	E054SB048	054SB04802	09/16/02	**532**	J	2.5	0.52 - 1.6
	E054SB049	054SB04902	09/16/02	0.837	J		
Lead	E054SB048	054SB04802	09/16/02	**12,100**	=	400	1.8 - 322
	E054SB049	054SB04902	09/16/02	365	=		
	E054SB050	054SB05002	09/16/02	5.15	=		
	E054SB051	054SB05102	09/16/02	8.77	=		
	E054SB052	054SB05202	12/20/02	231	=		
Mercury	E054SB048	054SB04802	09/16/02	0.684	J	1	0.04 - 0.9
	E054SB049	054SB04902	09/16/02	0.189	J		

[a] Listed soil screening levels (SSLs) are based on a dilution-attenuation factor (DAF) of 10.
[b] Project Team Notebook and Instructions (CH2M-Jones 12/2001).

J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.

Subsurface soil samples were collected for synthetic precipitation leaching procedure (SPLP) and totals analysis for select compounds.
NA indicates that the information is not available or not applicable.

TABLE 4-4
Organics Detected in Subsurface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/kg)	Qualifier	SSL [a] (DAF=10)	Sitewide Reference Concentrations [b]
Semivolatile Organic Compounds (SVOCs)							
Anthracene	E054SB053	054SB05302	12/20/02	370	=	6.00E+06	NA
	E054SB055	054SB05503	12/20/02	158	J		
Benzo(a)Anthracene	E054SB053	054SB05302	12/20/02	**3,570**	=	1.00E+03	627
	E054SB055	054SB05503	12/20/02	**1,380**	=		
Benzo(a)Pyrene	E054SB053	054SB05302	12/20/02	3,680	=	4.00E+03	623
	E054SB055	054SB05503	12/20/02	1,550	=		
Benzo(b)Fluoranthene	E054SB052	054SB05202	12/20/02	196	=	2.50E+03	631
	E054SB053	054SB05302	12/20/02	**6,580**	=		
	E054SB055	054SB05503	12/20/02	**3,070**	=		
Benzo(g,h,i)Perylene	E054SB053	054SB05302	12/20/02	1,320	J	NA	NA
	E054SB055	054SB05503	12/20/02	905	J		
Benzo(k)Fluoranthene	E054SB053	054SB05302	12/20/02	704	=	2.45E+04	631
	E054SB055	054SB05503	12/20/02	258	=		
Chrysene	E054SB052	054SB05202	12/20/02	36	J	8.00E+04	616
	E054SB053	054SB05302	12/20/02	3,540	=		
	E054SB055	054SB05503	12/20/02	1,450	=		
Fluoranthene	E054SB052	054SB05202	12/20/02	51.2	=	2.15E+06	NA
	E054SB053	054SB05302	12/20/02	4,260	=		
	E054SB054	054SB05402	12/20/02	43.6	J		
	E054SB055	054SB05503	12/20/02	2,370	=		
Fluorene	E054SB053	054SB05302	12/20/02	54.9	J	2.80E+05	NA
	E054SB055	054SB05503	12/20/02	20.8	J		
Indeno(1,2,3-c,d)pyrene	E054SB053	054SB05302	12/20/02	1,410	J	7.00E+03	592
	E054SB055	054SB05503	12/20/02	832	J		
Phenanthrene	E054SB052	054SB05202	12/20/02	37.6	J	6.00E+06	NA

TABLE 4-4
Organics Detected in Subsurface Soil
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/kg)	Qualifier	SSL [a] (DAF=10)	Sitewide Reference Concentrations[b]
Phenanthrene	E054SB053	054SB05302	12/20/02	1,120	=	6.00E+06	NA
	E054SB054	054SB05402	12/20/02	23	J		
	E054SB055	054SB05503	12/20/02	856	=		
Pyrene	E054SB052	054SB05202	12/20/02	69.3	J	2.10E+06	NA
	E054SB053	054SB05302	12/20/02	5,190	J		
	E054SB054	054SB05402	12/20/02	63.6	J		
	E054SB055	054SB05503	12/20/02	3,220	J		
BEQs	E054SB052	054SB05202	12/20/02	63.5	J	NA	1,400
	E054SB053	054SB05302	12/20/02	**4,935**	J		
	E054SB054	054SB05402	12/20/02	22.4	U		
	E054SB055	054SB05503	12/20/02	**2,164**	J		

[a]Listed soil screening levels (SSLs) are based on a dilution-attenuation factor (DAF) of 1 for VOCs and 10 for other compounds.
[b] Background PAHs Study Report, Technical Information for Development of Background BEQ Values (CH2M-Jones, 2001).

J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.
NA indicates that the information is not available or not applicable.

TABLE 4-5
Analytical Results for Compounds Detected in 1996 and 1997 Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Aluminum	E021GW002	021GW00202	08/07/96	9,450	=	NA	37,000	19 - 16,100
	E021GW003	021GW00302	08/07/96	42.0	J			
	E021GW003	021GW00304	02/26/97	80.9	J			
	E054GW002	054GW00204	02/27/97	25.5	J			
Antimony	E054GW002	054GW00204	02/27/97	**13.8**	J	6	NA	2 - 5
Arsenic[ca]	E021GW002	021GW00202	08/07/96	26.1	=	50	NA	3 - 316
	E021GW003	021GW00302	08/07/96	2.60	J			
	E054GW002	054GW00203	12/04/96	3.70	J			
Barium	E021GW001	021GW00102	08/08/96	97.2	J	,2000	NA	6 - 398
	E021GW002	021GW00202	08/07/96	107	J			
	E021GW003	021GW00302	08/07/96	160	J			
	E021GW003	021GW00303	12/04/96	40.9	J			
	E054GW001	054GW00102	08/09/96	3.70	J			
	E054GW002	054GW00202	08/08/96	74.3	J			
	E054GW002	054GW00203	12/04/96	133	J			
	E054GW003	054GW00302	08/08/96	77.8	J			
	E021GW003	021GW00304	02/26/97	58.1	J			
	E054GW002	054GW00204	02/27/97	117	J			
Beryllium	E021GW001	021GW00102	08/08/96	0.38	J	4	NA	0.3 - 0.9
	E054GW002	054GW00202	08/08/96	0.53	J			
	E054GW002	054GW00204	02/27/97	0.33	J			
Cadmium	E054GW002	054GW00202	08/08/96	0.81	J	5	NA	1.4
	E054GW002	054GW00204	02/27/97	0.47	J			
Calcium	E021GW001	021GW00102	08/08/96	121,000	=	NA/EN	NA/EN	1,170 - 260,000
	E021GW002	021GW00202	08/07/96	75,800	=			

TABLE 4-5
Analytical Results for Compounds Detected in 1996 and 1997 Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Calcium	E021GW003	021GW00302	08/07/96	95,100	=	NA/EN	NA/EN	1,170 - 260,000
	E021GW003	021GW00303	12/04/96	90,000	=			
	E054GW001	054GW00102	08/09/96	60,600	=			
	E054GW002	054GW00202	08/08/96	330,000	=			
	E054GW002	054GW00203	12/04/96	331,000	=			
	E054GW003	054GW00302	08/08/96	42,700	=			
	E021GW003	021GW00304	02/26/97	70,900	=			
	E054GW002	054GW00204	02/27/97	321,000	=			
Chromium, Total	E021GW002	021GW00202	08/07/96	45.4	=	100	NA	0.8 - 31
	E021GW003	021GW00302	08/07/96	1.70	J			
	E021GW003	021GW00304	02/26/97	1.30	J			
	E054GW002	054GW00204	02/27/97	6.00	J			
Cobalt	E021GW002	021GW00202	08/07/96	2.60	J	NA	220	0.9 - 44
	E021GW003	021GW00303	12/04/96	1.60	J			
	E054GW002	054GW00203	12/04/96	2.90	J			
Iron	E021GW001	021GW00102	08/08/96	3,040	=	NA	1,100	144 - 76,600
	E021GW002	021GW00202	08/07/96	14,400	=			
	E021GW003	021GW00302	08/07/96	5,420	=			
	E021GW003	021GW00303	12/04/96	3,510	=			
	E054GW001	054GW00102	08/09/96	71.9	J			
	E054GW002	054GW00202	08/08/96	31,500	=			
	E054GW002	054GW00203	12/04/96	30,700	=			
	E054GW003	054GW00302	08/08/96	12,900	=			
	E021GW003	021GW00304	02/26/97	3,370	J			
	E054GW002	054GW00204	02/27/97	18,000	=			
Lead	E021GW002	021GW00202	08/07/96	13.1	J	15	NA	2 - 47

TABLE 4-5
Analytical Results for Compounds Detected in 1996 and 1997 Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Lead	E021GW003	021GW00302	08/07/96	2.80	J	15	NA	2 - 47
	E054GW002	054GW00202	08/08/96	10.6	=			
	E021GW003	021GW00304	02/26/97	1.60	J			
	E054GW002	054GW00204	02/27/97	3.30	=			
Magnesium	E021GW001	021GW00102	08/08/96	15,800	=	NA/EN	NA/EN	790 - 1,160,000
	E021GW002	021GW00202	08/07/96	115,000	=			
	E021GW003	021GW00302	08/07/96	21,600	=			
	E021GW003	021GW00303	12/04/96	20,200	=			
	E054GW001	054GW00102	08/09/96	70,800	=			
	E054GW002	054GW00202	08/08/96	114,000	=			
	E054GW002	054GW00203	12/04/96	105,000	=			
	E054GW003	054GW00302	08/08/96	16,100	=			
	E021GW003	021GW00304	02/26/97	16,700	=			
	E054GW002	054GW00204	02/27/97	95,400	=			
Manganese	E021GW001	021GW00102	08/08/96	261	=	NA	**73**	2 - 2,650
	E021GW002	021GW00202	08/07/96	385	J			
	E021GW003	021GW00302	08/07/96	640	J			
	E021GW003	021GW00303	12/04/96	727	=			
	E054GW001	054GW00102	08/09/96	104	=			
	E054GW002	054GW00202	08/08/96	633	=			
	E054GW002	054GW00203	12/04/96	642	=			
	E054GW003	054GW00302	08/08/96	524	=			
	E021GW003	021GW00304	02/26/97	554	=			
	E054GW002	054GW00204	02/27/97	421	=			
Mercury	E021GW002	021GW00202	08/07/96	0.59	=	2	NA	0.14 - 0.6
Nickel	E021GW002	021GW00202	08/07/96	9.10	J	NA	73	0.9 - 17

TABLE 4-5
Analytical Results for Compounds Detected in 1996 and 1997 Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Nickel	E021GW003	021GW00302	08/07/96	2.80	J	NA	73	0.9 - 17
	E021GW003	021GW00303	12/04/96	30.5	J			
	E054GW002	054GW00203	12/04/96	**129**	=			
	E021GW003	021GW00304	02/26/97	1.50	J			
	E054GW002	054GW00204	02/27/97	7.20	J			
Potassium	E021GW001	021GW00102	08/08/96	15,200	=	NA/EN	NA/EN	1,320 - 289,000
	E021GW002	021GW00202	08/07/96	49,100	=			
	E021GW003	021GW00302	08/07/96	22,000	=			
	E021GW003	021GW00303	12/04/96	23,000	=			
	E054GW001	054GW00102	08/09/96	53,900	=			
	E054GW002	054GW00202	08/08/96	50,400	=			
	E054GW002	054GW00203	12/04/96	42,900	=			
	E054GW003	054GW00302	08/08/96	19,600	=			
	E021GW003	021GW00304	02/26/97	17,600	=			
	E054GW002	054GW00204	02/27/97	41,100	=			
Silver	E021GW001	021GW00102	08/08/96	2.40	J	NA	18	2.0 - 4.0
	E021GW003	021GW00303	12/04/96	1.30	J			
	E054GW002	054GW00203	12/04/96	1.40	J			
Sodium	E021GW001	021GW00102	08/08/96	189,000	=	NA/EN	NA/EN	NA
	E021GW002	021GW00202	08/07/96	1,080,000	=			
	E021GW003	021GW00302	08/07/96	80,800	=			
	E021GW003	021GW00303	12/04/96	78,600	=			
	E054GW001	054GW00102	08/09/96	643,000	=			
	E054GW002	054GW00202	08/08/96	699,000	=			
	E054GW002	054GW00203	12/04/96	658,000	=			

TABLE 4-5
Analytical Results for Compounds Detected in 1996 and 1997 Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Sodium	E054GW003	054GW00302	08/08/96	114,000	=	NA/EN	NA/EN	NA
	E021GW003	021GW00304	02/26/97	59,500	=			
	E054GW002	054GW00204	02/27/97	690,000	=			
Thallium	E021GW003	021GW00303	12/04/96	3.20	J	2	NA	3.0 - 6.0
	E054GW002	054GW00203	12/04/96	3.60	J			
Vanadium	E021GW002	021GW00202	08/07/96	15.5	J	NA	26	0.6 - 26
	E021GW003	021GW00303	12/04/96	1.10	J			
	E054GW002	054GW00203	12/04/96	1.10	J			
Zinc	E021GW001	021GW00102	08/08/96	33.9	=	NA	1,100	5 - 144
	E021GW002	021GW00202	08/07/96	76.2	=			
	E021GW003	021GW00303	12/04/96	10.5	J			
	E054GW002	054GW00202	08/08/96	33.3	=			
	E054GW002	054GW00203	12/04/96	42.7	=			
Carbon Disulfide	E054GW001	054GW00102	08/09/96	2.00	J	NA	100	NA

[a] National Primary Drinking Water Standards (EPA, 3/2001).
[b] U.S. EPA Region III RBC Table (hazard index [HI] = 0.1 for noncarcinogens, 10/2000).
[c] Project Team Notebook and Instructions (CH2M-Jones 12/2001).
[ca] indicates that the compound is classified as a carcinogen.

J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.
NA indicates that the information is not available or not applicable.
EN indicates that the chemical is an essential nutrient.

TABLE 4-6
Filtered and Unfiltered Groundwater Analytical Results
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Unfiltered (µg/L)	Analytical Qualifier	Results Filtered (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Range of Background Concentrations[c]
Aluminum	E021GW001	021GW001RM2	09/03/02	228	U	16.4	U	NA	37000	19 - 16,100
	E021GW002	021GW002RM2	09/30/02	386	=	12.8	U			
	E021GW004	021GW004M2	10/01/02	31.3	U	6.19	U			
	E054GW002	054GW002M2	09/30/02	26	U	6.19	U			
Antimony	E021GW001	021GW001RM2	09/03/02	4.79	U	4.79	U	6	NA	2 - 5
	E021GW002	021GW002RM2	09/30/02	4.79	U	4.79	U			
	E021GW004	021GW004M2	10/01/02	4.79	U	4.79	U			
	E054GW002	054GW002M2	09/30/02	**24.9**	J	**18.1**	J			
Arsenic[ca]	E021GW001	021GW001RM2	09/03/02	3.97	U	3.97	U	50	NA	3 - 316
	E021GW002	021GW002RM2	09/30/02	35.6	=	14.2	=			
	E021GW004	021GW004M2	10/01/02	20.8	=	7.14	J			
	E054GW002	054GW002M2	09/30/02	3.97	U	3.97	U			
Barium	E021GW001	021GW001RM2	09/03/02	532	=	522	=	2,000	NA	6 - 398
	E021GW002	021GW002RM2	09/30/02	55.2	J	34.9	J			
	E021GW004	021GW004M2	10/01/02	791	=	666	=			
	E054GW002	054GW002M2	09/30/02	73.8	J	68.4	J			
Beryllium	E021GW001	021GW001RM2	09/03/02	0.185	U	0.185	U	4	NA	0.3 - 0.9
	E021GW002	021GW002RM2	09/30/02	0.185	U	0.185	U			
	E021GW004	021GW004M2	10/01/02	0.185	U	0.185	U			
	E054GW002	054GW002M2	09/30/02	0.185	U	0.185	U			
Cadmium	E021GW001	021GW001RM2	09/03/02	0.522	U	0.253	U	5	NA	1.4
	E021GW002	021GW002RM2	09/30/02	0.288	U	0.21	U			
	E021GW004	021GW004M2	10/01/02	0.21	U	0.21	U			
	E054GW002	054GW002M2	09/30/02	0.795	U	0.536	U			
Calcium	E021GW001	021GW001RM2	09/03/02	484,000	=	490,000	=	NA/EN	NA/EN	1,170 - 260,000

TABLE 4-6
Filtered and Unfiltered Groundwater Analytical Results
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Unfiltered (µg/L)	Analytical Qualifier	Results Filtered (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Range of Background Concentrations[c]
Calcium	E021GW002	021GW002RM2	09/30/02	49,600	=	48,400	=	NA/EN	NA/EN	1,170 - 260,000
	E021GW004	021GW004M2	10/01/02	107,000	=	104,000	=			
	E054GW002	054GW002M2	09/30/02	130,000	=	129,000	=			
Chromium, Total	E021GW001	021GW001RM2	09/03/02	0.692	U	0.532	U	100	NA	0.8 - 31
	E021GW002	021GW002RM2	09/30/02	1.65	U	0.61	U			
	E021GW004	021GW004M2	10/01/02	0.532	U	0.532	U			
	E054GW002	054GW002M2	09/30/02	1.56	U	0.532	U			
Cobalt	E021GW001	021GW001RM2	09/03/02	0.581	U	0.581	U	NA	220	0.9 - 44
	E021GW002	021GW002RM2	09/30/02	0.581	U	0.581	U			
	E021GW004	021GW004M2	10/01/02	0.581	U	0.581	U			
	E054GW002	054GW002M2	09/30/02	0.581	U	0.581	U			
Copper	E021GW001	021GW001RM2	09/03/02	4.1	U	1.3	U	1,300	NA	0.9 - 8
	E021GW002	021GW002RM2	09/30/02	1.86	U	1.3	U			
	E021GW004	021GW004M2	10/01/02	1.41	U	1.3	U			
	E054GW002	054GW002M2	09/30/02	21.7	U	3.03	U			
Iron	E021GW001	021GW001RM2	09/03/02	9,610	=	13.6	U	NA	1100	144 - 76,600
	E021GW002	021GW002RM2	09/30/02	7,560	=	107	=			
	E021GW004	021GW004M2	10/01/02	15,200	=	1,860	=			
	E054GW002	054GW002M2	09/30/02	8,060	=	353	=			
Lead	E021GW001	021GW001RM2	09/03/02	12.8	=	3.99	U	15	NA	2 - 47
	E021GW002	021GW002RM2	09/30/02	3.97	U	1.46	U			
	E021GW004	021GW004M2	10/01/02	2.49	U	2.15	U			
	E054GW002	054GW002M2	09/30/02	**258**	=	1.49	U			
Magnesium	E021GW001	021GW001RM2	09/03/02	174,000	=	180,000	=	NA/EN	NA/EN	790 - 1,160,000
	E021GW002	021GW002RM2	09/30/02	10,300	=	9920	=			

TABLE 4-6
Filtered and Unfiltered Groundwater Analytical Results
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Unfiltered (µg/L)	Analytical Qualifier	Results Filtered (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Range of Background Concentrations[c]
Magnesium	E021GW004	021GW004M2	10/01/02	17,200	=	17,300	=	NA/EN	NA/EN	790 - 1,160,000
	E054GW002	054GW002M2	09/30/02	155,000	=	151,000	=			
Manganese	E021GW001	021GW001RM2	09/03/02	1,920	=	2,020	=	NA	73	2 - 2,650
	E021GW002	021GW002RM2	09/30/02	156	=	143	=			
	E021GW004	021GW004M2	10/01/02	365	=	345	=			
	E054GW002	054GW002M2	09/30/02	140	=	136	=			
Mercury	E021GW001	021GW001RM2	09/03/02	0.064	U	0.064	U	2	NA	0.14 - 0.6
	E021GW002	021GW002RM2	09/30/02	0.064	U	0.064	U			
	E021GW004	021GW004M2	10/01/02	0.179	J	0.064	U			
	E054GW002	054GW002M2	09/30/02	0.064	U	0.064	U			
Nickel	E021GW001	021GW001RM2	09/03/02	0.837	U	0.837	U	NA	73	0.9 - 17
	E021GW002	021GW002RM2	09/30/02	2.29	U	2.69	U			
	E021GW004	021GW004M2	10/01/02	0.837	U	0.872	U			
	E054GW002	054GW002M2	09/30/02	12.3	J	10.9	J			
Potassium	E021GW001	021GW001RM2	09/03/02	50,400	J	52,700	J	NA/EN	NA/EN	1,320 - 289,000
	E021GW002	021GW002RM2	09/30/02	15,900	=	15,500	=			
	E021GW004	021GW004M2	10/01/02	12,300	=	12,400	=			
	E054GW002	054GW002M2	09/30/02	55,200	J	59,400	J			
Selenium	E021GW001	021GW001RM2	09/03/02	2.67	U	2.67	U	50	NA	3 - 5
	E021GW002	021GW002RM2	09/30/02	2.67	U	2.67	U			
	E021GW004	021GW004M2	10/01/02	2.85	U	2.67	U			
	E054GW002	054GW002M2	09/30/02	2.67	U	2.67	U			
Silver	E021GW001	021GW001RM2	09/03/02	1.15	U	1.15	U	NA	18	2 - 4
	E021GW002	021GW002RM2	09/30/02	1.15	U	1.15	U			
	E021GW004	021GW004M2	10/01/02	1.15	U	1.15	U			
	E054GW002	054GW002M2	09/30/02	1.15	U	1.15	U			

TABLE 4-6
Filtered and Unfiltered Groundwater Analytical Results
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Unfiltered (µg/L)	Analytical Qualifier	Results Filtered (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Range of Background Concentrations[c]
Sodium	E021GW001	021GW001RM2	09/03/02	2,280,000	=	2,400,000	=	NA/EN	NA/EN	NA
	E021GW002	021GW002RM2	09/30/02	279,000	=	295,000	=			
	E021GW004	021GW004M2	10/01/02	34,500	=	35,200	=			
	E054GW002	054GW002M2	09/30/02	1,400,000	=	1,530,000	=			
Thallium	E021GW001	021GW001RM2	09/03/02	**14.3**	=	**15.7**	=	2	NA	3 - 6
	E021GW002	021GW002RM2	09/30/02	4.99	U	4.99	U			
	E021GW004	021GW004M2	10/01/02	4.99	U	4.99	U			
	E054GW002	054GW002M2	09/30/02	4.99	U	4.99	U			
Vanadium	E021GW001	021GW001RM2	09/03/02	1.11	J	0.793	U	NA	26	0.6 - 26
	E021GW002	021GW002RM2	09/30/02	1.31	J	0.793	U			
	E021GW004	021GW004M2	10/01/02	0.793	U	0.793	U			
	E054GW002	054GW002M2	09/30/02	1.13	J	0.793	U			
Zinc	E021GW001	021GW001RM2	09/03/02	26	=	4.26	U	1,100	NA	5 - 141
	E021GW002	021GW002RM2	09/30/02	23.5	=	12.1	U			
	E021GW004	021GW004M2	10/01/02	10.8	U	1.77	U			
	E054GW002	054GW002M2	09/30/02	103	=	74.7	=			

[a] National Primary Drinking Water Standards (EPA, 3/2001).
[b] U.S. EPA Region III RBC Table (hazard index [HI] = 0.1 for noncarcinogens, 10/2000).
[c] Project Team Notebook and Instructions (CH2M-Jones 12/2001).
[ca] indicates that the compound is classified as a carcinogen.

J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.
NA indicates that the information is not available or not applicable.
EN indicates that the chemical is an essential nutrient.

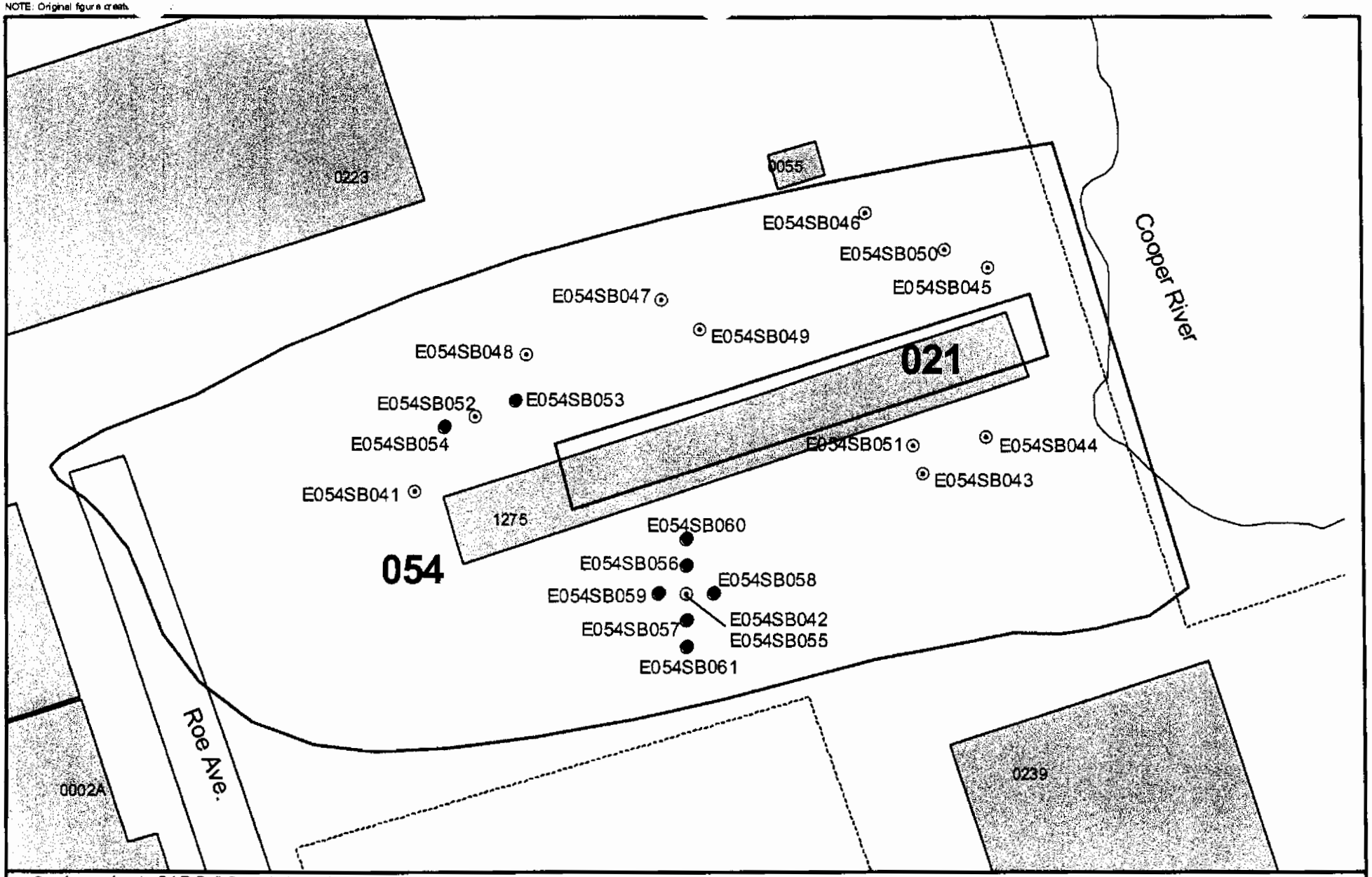
TABLE 4-7
Detected PAHs in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Analytical Results (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)
Acenaphthene	E021GW004	021GW004M3	12/20/02	24.3	=	NA	37
Anthracene	E021GW004	021GW004M3	12/20/02	0.58	J	NA	18
Fluoranthene	E021GW004	021GW004M3	12/20/02	1.9	=	NA	150
Fluorene	E021GW004	021GW004M3	12/20/02	9.1	=	NA	24
Naphthalene	E021GW004	021GW004M3	12/20/02	0.6	J	NA	0.65
Phenanthrene	E021GW004	021GW004M3	12/20/02	0.75	J	NA	18
Pyrene	E021GW004	021GW004M3	12/20/02	1.2	J	NA	18

[a] National Primary Drinking Water Standards (EPA, 3/2001).
[b] U.S. EPA Region III RBC Table (hazard index [HI] = 0.1 for noncarcinogens, 10/2000).

J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.
None of the detected SVOCs are cPAHs (BEQs).

NOTE: Aerial Photo Date is
NOTE: Original figure creat



Approximate SAP Soil Sample Locations
IM Soil Sample Locations
Roads
Shoreline
SWMU Boundary
Buildings
Zone Boundary

N

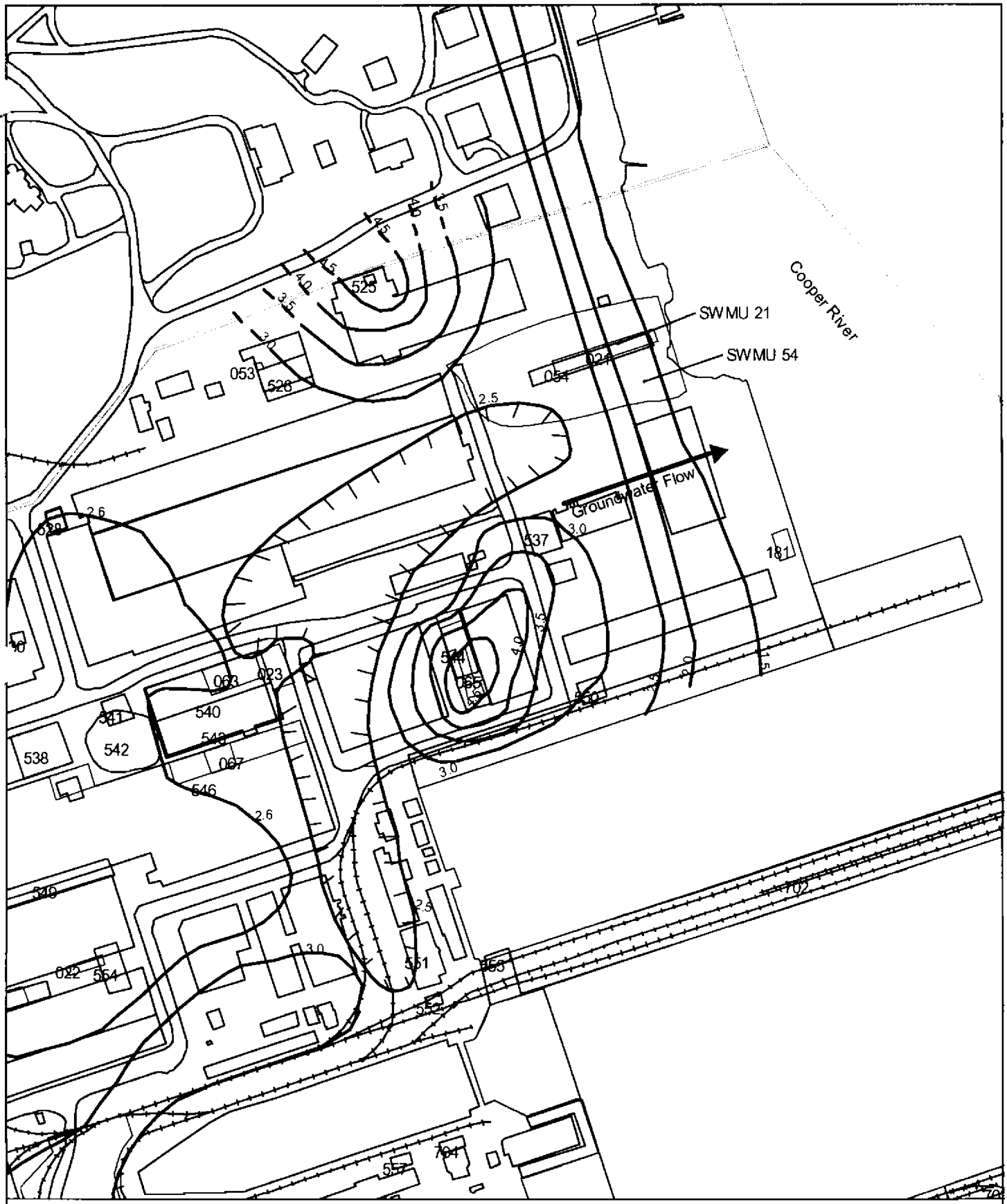
0 60 120 Feet

1 inch = 50 feet

Figure 4-1
Post RFI Soil Sample Locations
SWMUs 21 and 54, Zone E
Charleston Naval Complex

CH2M HILL

File Path: C:\1\gis\Projects\Zone_E\Swmu_21_Swmu_54\Aprs\Copyofswmu21and54fge.apr, Date: 29 Apr 2003 14:21, User: NMOUDRY, Figure 4-1 Post RFI Soil Sample Locations - SWMU 21 and 54



Known Shallow Groundwater Contour (5/14/02)
Inferred Shallow Groundwater Contour (5/14/02)
Fence
Railroads
Roads
Groundwater Well
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

N

0 200 400 Feet

Figure 4-2
Shallow Groundwater Contours
SWMU 21 and SWMU 54, Zone E
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_E\ZoneE_GW\zoneeo_gw_figs.apr, Date: 04 Jul 2003 10:03, User: NMOUDRY, Figure 4-2 SWMU 21 and 54

Section 5.0

5.0 COPC/COC Refinement

5.1 Introduction

This section discusses the COCs identified in the *Zone E RFI Report* (EnSafe, 1997), and the COPCs identified in subsequent sampling and screening (see Section 4.0). This section incorporates relevant information from the implementation of the IMs conducted by the DET and CH2M-Jones to remediate surface soil at the site for BEQs.

During the 2003 IM by CH2M-Jones, clean soil from offsite was used as backfill to replace contaminated soil removed during the IM. A reassessment of the soil contamination was made replacing the results of the removed samples with analytical results of the clean fill material.

Tables 5-1 and 5-2 present the residual concentrations of COCs/COPCs from previous sampling efforts conducted at the site for surface and subsurface soil, respectively. Table 5-3 presents COC/COPC concentrations in groundwater. Refer to Figure 3-1 for the sample locations and the boundaries of the individual IM excavations.

This section also rescreens the VOC soil data from the RFI against a generic SSL based on a DAF=1 as agreed to by the BCT.

5.2 Surface Soil COCs

The *Zone E RFI Report, Revision 0* identified arsenic, beryllium, and BEQs as surface soil COCs based on both the residential and industrial exposure scenarios. In Section 4.0, antimony, BEQs, lead, and mercury were identified as COPCs in surface soil based on the post-RFI sampling. Antimony and mercury were identified as COPCs based on generic SSL exceedances. BEQs and lead exceeded both their respective industrial RBCs and generic SSLs.

5.2.1 Arsenic

Arsenic was identified as a surface soil COC during the original RFI because of exceedances of the residential and industrial RBC. During the RFI, arsenic was detected in all surface soil samples, all of which exceeded the EPA Region III residential RBC of 0.43 mg/kg. Table 5-1 lists the detected arsenic concentrations in surface soil at SWMUs 21 and 54, including the

original RFI samples, which were removed during the IM completed by the DET. None of the arsenic detections exceeded the maximum Zone E background concentration of 68 mg/kg.

Arsenic was detected in surface soil samples during subsequent surface soil sampling by CH2M Jones. All detections were within the range of arsenic detected in Zone E grid soil samples.

The background soils at the CNC have been shown to have concentrations of arsenic above both the EPA Region III residential and industrial RBCs. Arsenic concentrations detected in background (grid) soil samples in Zone E ranged from 0.95 to 68 mg/kg, with a mean concentration of 8.5 mg/kg.

For sites where background arsenic levels exceed RBCs, EPA Region IV typically considers arsenic concentrations in surface soil of up to 20 mg/kg and 270 mg/kg as acceptable for unrestricted and industrial land use, respectively (EPA, 2001). Based on these criteria, and based on the lack of any detections in the 2002 surface soil samples above 20 mg/kg, arsenic would not be considered a COC for either the unrestricted or industrial land use scenarios.

5.2.2 Beryllium

Beryllium was identified as a COC during the original RFI due to exceedances of the former industrial RBC of 1.3 mg/kg in effect at the time of the RFI. Since the original RFI was completed, the residential and industrial RBCs for beryllium have been increased significantly. The current residential and industrial RBCs for beryllium are 16 mg/kg and 410 mg/kg, respectively, at HI=0.1. Inspection of the beryllium data for the site, as presented in Table 5-1, indicates that none of the beryllium detections exceeded the current residential or industrial RBC (HI=0.1). Therefore, beryllium is not considered a COC for this site.

5.2.3 BEQs

Surface soil samples collected at boring locations E054SB041 through E054SB052 provided data regarding current surface soil quality. Results from these samples were discussed in Section 4.0 and are presented in Table 5-1.

BEQs were detected in post-RFI sample E54SB042 at a concentration of 12,095 μg/kg, above the CNC sitewide reference concentration of 1,304 μg/kg for surface soil. Additional delineation samples were collected to determine the extent of BEQ-impacted soil at this location and this area became the focus of an IM completed by CH2M-Jones. Section 7.0 of

this RFIRA/IMCR/CMSWP presents details of the activities performed during this IM. Four additional surface soil samples (E054SB056 through E054SB059) were collected at a distance of 10 feet to the north, south, east, and west of soil boring E054SB042. BEQs in two samples (E054SB056 and E054SB057) exceeded the CNC sitewide reference concentration. Additional samples E054SB060 and E054SB061 were collected to complete the delineation and BEQs in these samples were below the CNC sitewide reference concentration, indicating that the extent of BEQ-impacted surface soil was identified.

Remedial actions to remove BEQ-contaminated soil from SWMUs 21 and 54 were then implemented. The three surface soil samples that exhibited BEQ concentrations above the CNC sitewide reference concentration of 1,304 μg/kg were removed during the IM. Further details of the IM conducted by CH2M-Jones are described in Section 7.0.

The residual BEQ concentrations in remaining sampling locations are below the CNC sitewide reference concentration, as a result of the IM.

Benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, and dibenz[a,h]anthracene were detected at concentrations that exceeded their individual generic SSLs (DAF=10) in a limited number of surface soil samples. With the exception of benzo[a]anthracene in surface soil at boring E054SB052 (1,330 μg/kg), surface soil SSL exceedances of cPAHs were limited to borings E054SB042, E054SB056, and E054SB057. Soil at these boring locations were removed during the IM. Therefore, only benzo[a]anthracene in a single sample (E054SB052) is currently present in site surface soil above its generic SSL.

Site-specific SSLs were calculated for the seven cPAHs that are included in the BEQ calculation, as presented in Table 5-4. The SSL calculation is consistent with the *Soil Screening Guidance: User's Guide* (EPA, 1996a) and the *Soil Screening Guidance: Technical Background Document* (EPA, 1996b). The table shows the calculation of SSLs for both paved and unpaved site conditions. The unpaved SSLs are used as groundwater protection screening criteria in Tables 5-1 and 5-2.

The site-specific SSL for benzo[a]anthracene was calculated to be 5,480 μg/kg. The benzo[a]anthracene concentration in the surface soil sample from soil boring E054SB052 was 1,330 μg/kg, which is below the site-specific SSL. Based on these data, existing concentrations of benzo[a]anthracene are adequately protective of shallow groundwater. Additionally, benzo[a]anthracene has not been detected in site groundwater, further indicating that existing concentrations of this compound in soil are adequately protective of shallow groundwater.

Based on the above discussion, BEQs are not considered surface soil COCs for this site.

5.2.4 Antimony

Antimony was identified as a COPC in surface soil based on an exceedance of its generic SSL in post-RFI sampling. As part of the post RFI sampling, SPLP samples were also collected to calculate site-specific SSLs for select metals, including antimony. These data were discussed in Section 4.0 and the SSL calculations are presented in Appendix D.

Individual SSLs were calculated for each SPLP sample. Detected antimony concentrations in the soil samples ranged from 0.837 J mg/kg to 532 J mg/kg. Antimony was not detected in four of the soil samples or in the leachate of any of the SPLP samples. These data indicate that soil concentrations of antimony as high as 532 mg/kg do not pose a threat to shallow groundwater. Calculated site-specific SSLs (presented in Appendix D) are based on using half the reporting limit in the SSL calculation for samples where antimony was not detected in the leachate. Samples that did not have detectable levels of antimony in the soil sample were excluded from the SSL calculation. The SSL based on the geometric mean of the individual Kd values for antimony was 6.6 mg/kg based on a DAF of 4.5 (unpaved scenario).

One surface soil sample (at soil boring E054SB045, 10.9 mg/kg) contained antimony at a concentration above the calculated site-specific SSL of 6.6 mg/kg. To evaluate the potential for leaching to shallow groundwater, the mean antimony concentration in surface soil was calculated and compared to the site-specific SSL. Because the site is expected to remain industrial the entire site was considered to be the exposure area. The mean antimony concentration was calculated to be 2.6 mg/kg, which is below the site-specific SSL and is also below the range of antimony detected in Zone E grid samples (up to 7.5 mg/kg).Based on these considerations, antimony is not considered a surface soil COC for the industrial or unpaved land use scenarios at SWMUs 21 and 54.

5.2.5 Lead

Lead was identified as a COPC based on the analytical results from a single post-RFI sample (054SB05201, 1,230 mg/kg) that indicated that lead marginally exceeded its target cleanup level of 1,218 mg/kg for protection of industrial site workers. Four samples also exceeded the generic SSL of 400 mg/kg.

Lead was included in the SPLP analyses. Lead was detected in all of the soil SPLP samples with concentrations ranging from 5.15 mg/kg to 12,100 mg/kg. Lead was detected in the leachate of three samples with detected concentrations between 0.042 J milligrams per liter

(mg/L) to 0.191 mg/L. SSLs for individual samples were between 13 mg/kg and 136,100 mg/kg based on an unpaved scenario (DAF=4.5). The SSL based on the geometric mean of individual Kd values was calculated to be 616 mg/kg.

The lead exposure concentration for SWMUs 21 and 54 was calculated as the mean concentration for both the human exposure scenario and for protection of shallow groundwater. Using the mean concentration for human exposure is appropriate because the biokinetic uptake model, which is the basis for the calculated RBC, is based on exposure to the site average lead concentration. The mean lead concentration was calculated to be 370 mg/kg, which is below both the site-worker target cleanup level and the site-specific SSL. Therefore, lead is not identified as a surface soil COC at SWMUs 21 and 54 for the industrial or unpaved land use scenarios.

5.2.6 Mercury

Mercury was identified as a COPC based on exceedances of its generic SSL (1 mg/kg). Two surface soil samples (E054SB041, 2.74 mg/kg and E054SB045, 1.31 mg/kg) contained mercury at concentrations above its generic SSL in post-RFI samples. No sample contained mercury above its industrial RBC.

Based on the SPLP testing, a site-specific SSL for mercury of 13 mg/kg was detected (see Appendix D). The mean (average) concentration of mercury in surface is estimated at 0.54 mg/kg, which is below the generic SSL of 1 mg/kg as well as below the site-specific SSL of 13 mg/kg. On this basis, mercury is not considered a COC for the surface soil for the industrial or unpaved land use scenarios.

5.3 Subsurface Soil COCs

As discussed in Section 4.0, antimony, BEQs, and lead were identified as COPCs based on exceedances of generic SSLs in subsurface soil in the post RFI sampling.

5.3.1 BEQs

With the exception of benzo[a]anthracene and chrysene, all cPAH exceedances of the generic SSL in RFI subsurface soil occurred in a single sample, at boring E054SB031. Benzo[a]anthracene was detected above its generic SSL in subsurface soil samples collected from soil borings E054SB031, E054SB022, and E054SB027; chrysene was detected above its generic SSL in soil borings E054SB031 and E054SB022.

BEQ constituents were detected above their respective generic SSLs in two post-RFI subsurface soil samples. Subsurface soil samples at soil borings E054SB053 and E054SB055 had calculated BEQ values that exceeded the CNC subsurface soil sitewide reference concentration of 1,400 $\mu g/kg$.

As previously discussed, site-specific SSLs for each cPAH were developed for SWMUs 21 and 54. Table 5-2 compares concentrations of cPAHs in subsurface soil to the unpaved site-specific SSLs. Inspection of Table 5-2 reveals that three soil borings (E054SB031) has cPAH values that exceed the site specific SSLs. Benzo[a]pyrene was detected above its site-specific SSL in samples from soil borings E054SB053 and E054SB055. Benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene exceeded their site-specific SSLs in the subsurface soil sample from boring E054SB031.

The reported cPAH and BEQ values for the subsurface soil sample at boring E054SB031 are significantly greater than in other samples at the site and are elevated relative to samples collected at the CNC in general. Other samples collected around the vicinity of boring E054SB031 during the original RFI did not exhibit the unusually high BEQ values found at E054SB031, although the BEQ and cPAH values reported for boring E054SB035 were elevated above background levels.

Because of the unusually high BEQ value at boring E054SB031, this location, as well as soil at boring E054SB035, was resampled in December 2002 to assess whether a significant source area of BEQ containing material (such as tar) was present at that location. The data for these resampling borings (E054SB053 and E054SB054), are also provided in Table 5-2. These data indicate elevated BEQs above background, but the results are much lower than the original value reported for E054SB031 and do not reflect a significant BEQ source area.

Even though the original reported value for E054SB031 appears to be a statistical outlier, mean subsurface soil concentrations were calculated for the cPAHs that have site specific SSL exceedances. The results are presented in Table 5-2. These results indicate that the mean concentrations of all cPAHs (except for benzo[a]pyrene) are below the unpaved site-specific SSLs.

No PAHs have been detected in groundwater at the site at concentrations above their RBCs, indicating that BEQs are not leaching at significant levels. Therefore, none of the individual PAHs are considered to be COCs from a leaching perspective.

However, because the total BEQ values for several subsurface soil samples exceed the CNC subsurface soil sitewide reference concentration of 1,400 μg/kg, BEQs are retained as subsurface soil COCs for this site.

5.3.2 Antimony

Five of 35 subsurface soil samples contained antimony at concentrations were above the site-specific SSL of 6.6 mg/kg. The site-specific SSL of 6.6 mg/kg was calculated for antimony based on SPLP data collected at the site, using the geometric mean of the estimated Kd value. Because antimony was not detected in the SPLP extract from any samples (including an SPLP test on a sample with antimony at a concentration of 532 mg/kg), its concentration in the extract was estimated at half the detection limit.

The SPLP data suggest that soil concentrations of antimony, even at a concentration of 532 mg/kg, do not represent a leaching hazard. However, since antimony was detected in groundwater samples above its MCL, further evaluation of its potential leachability was conducted.

The mean antimony concentration for subsurface soil was calculated to evaluate if existing concentrations of antimony represent a threat to shallow groundwater. The mean antimony concentration was calculated to be 22.8 mg/kg. This value is significantly influenced by the evaluated value of 532 mg/kg detected in one of the SPLP samples. Because the mean antimony concentration exceeds the site specific SSL and because antimony was detected in groundwater samples above its MCL, antimony is retained as a subsurface soil COC.

5.3.3 Lead

A site-specific SSL of 616 mg/kg was calculated for lead based on SPLP data collected at the site, as described in Appendix D. Seven of 40 subsurface soil samples contained lead at concentrations that were above the site-specific SSL of 616 mg/kg. Several subsurface soil samples, such as borings E054SB030, E054SB031, E054SB035, and E054SB048 had significant exceedances of the SSL.

The mean lead concentration for subsurface soil was calculated to evaluate if existing concentrations of lead represent a threat to shallow groundwater. The mean lead concentration was calculated to be 1,730 mg/kg, which is above the calculated site-specific SSL. Based on these results, lead is retained as a subsurface soil COC.

5.4 Summary of Soil COCs

Based on the above discussion, there are no COCs identified for surface soil for the industrial or unpaved land use scenarios at SWMUs 21 and 54 . Antimony, BEQs, and lead are identified as COCs in subsurface soil.

5.5 Groundwater COCs

The *Zone E RFI Report, Revision 0* identified antimony, arsenic, and thallium as shallow groundwater COCs. As discussed in Section 4.0, antimony, lead, nickel, and thallium were identified as COPCs in groundwater as a result of the post-RFI sampling. These COPCs are evaluated further below to determine if they are considered COCs. Groundwater data for these chemicals are summarized in Table 5-3.

5.5.1 Antimony

Antimony was identified as a COC based on the analytical results from the April 1996 RFI samples. It was detected in two of the six samples collected in 1996. Both monitoring wells where antimony was detected (E021GW002, 10.2 μg/L and E054GW002, 10.9 μg/L) contained antimony at concentrations that exceed its MCL of 6 μg/L. Antimony was not detected in either of the two subsequent sampling events from monitoring wells E021GW002 or E054GW002. Antimony was detected above its MCL again in monitoring well E054GW002 in February 1997 (13.8 μg/kg) and in September 2002 (unfiltered 24.9 μg/kg and filtered 18.1 μg/kg). It is possible that turbidity influenced the sample results during the 1997 sampling, as the groundwater sampling forms indicate that the turbidity during well purging ranged from 7 to 62 nephelometric turbidity units (NTUs). Additionally, the turbidity in well E054GW002 during the September 2002 sampling started at 211 NTUs, was noted to vary somewhat erratically during purging, ranging from 53 to 87 NTUs during well purging. However, its presence in the filtered sample suggests that turbidity may not have been a factor for that sample.

Because antimony has been detected in site groundwater at concentrations that exceed its MCL, antimony is identified as a groundwater COC at SWMUs 21 and 54.

5.5.2 Arsenic

Arsenic was identified as a groundwater COC during the intial RFI due to exceedances of its drinking water RBC. Detected arsenic concentrations for groundwater at the site are

presented in Table 5-3. None of the reported arsenic concentrations exceeded the 50 $\mu g/L$ MCL. Therefore, arsenic is not considered a COC for groundwater at this site.

5.5.3 Lead

Lead was identified as a COPC in Section 4.0 of this report due to an elevated detection during the September 2002 sampling. Lead was detected at a concentration of 258 $\mu g/L$ in the unfiltered sample from monitoring well E054GW002. However, lead was not detected in the filtered sample from the same well, indicating that the detected concentration of lead may have been due to suspended solids in the sample. No other detections of lead at a concentration greater than 15 $\mu g/L$ have occurred, thus the reported value for lead appears anomalous. Based on the available data, lead is retained as a groundwater COC. However, additional sampling is recommended during the CMS phase to assess whether the reported detection is related to turbidity.

5.5.4 Nickel

Nickel was identified as a COPC based on comparison of nickel concentrations in the last three rounds of the original RFI samples to COPC screening criteria. One sample from monitor well E054GW002 (129 $\mu g/L$) contained nickel above its tap water RBC (73 $\mu g/L$, HI=0.1) in the December 1996 sampling effort. Subsequent samples collected from monitoring well E054GW002 did not contain nickel at concentrations that exceed its RBC. The single detection of nickel above screening criteria may be due to suspended solids in the sample. However, nickel is retained as a groundwater COC at SWMUs 21 and 54. Additional sampling during the CMS phase is recommended to confirm whether this anomalous detection is turbidity-related.

5.5.5 Thallium

Thallium has been intermittently detected above its MCL in samples collected from three of the site monitoring wells. The intermittent nature of the detections and the fact that a thallium source has not been identified at SWMUS 21 AND 54 suggest that these occurrences are of natural origin and may be due to turbidity. Comparison of thallium concentrations in site groundwater to the Zone E range of background concentrations appear to support this hypothesis for historical exceedances, however thallium concentrations in the filtered and unfiltered samples collected from monitoring well E021GW001 in September 2002 are above the MCL. Therefore, thallium is identified as a COC at SWMUs 21 and 54.

Based on the above discussions, antimony, lead, nickel, and thallium have been identified as groundwater COCs at SWMUs 21 and 54.

5.6 Soil VOC Rescreening using DAF=1

As agreed to by the BCT, detected VOCs have been reevaluated by screening the analytical results against SSLs based on a DAF of 1. Table 5-5 presents the data and the screening criteria.

Only one VOC, methylene chloride, was detected at a concentration that exceeded its SSL (0.001, DAF=1). It was detected in a single surface soil sample, at a concentration of 0.0061 mg/kg, collected at soil boring E021SB031..

A site-specific SSL was calculated for methylene chloride. The calculation and the input parameters are presented in Table 5-4. The site-specific SSL was 0.013 mg/kg. The detected concentration of methylene chloride (0.0061 mg/kg) was below the site-specific SSL. Therefore, methylene chloride is not identified as a surface soil COC for SWMUs 21 and 54.

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations[c]
Metals, mg/kg									
Arsenic	E021S0011	021S001101	10/24/93	8.2	=		3.8	14.5	0.95 - 68
	E021S0021	021S002101	10/24/93	5.1	=				
	E021S0031	021S003101	10/24/93	3.3	=				
	E021SB011	021SB01101	10/06/93	1.6	J				
	E021SB021	021SB02101	10/06/93	3.2	J				
	E021SB031	021SB03101	10/07/93	26	J				
	E021SB041	021SB04101	10/19/93	1.1	U				
	E021SB051	021SB05101	10/19/93	2.7	=				
	E021SB061	021SB06101	10/19/93	3.6	=				
	E021SB071	021SB07101	10/19/93	2.3	=				
	E021SB081	021SB08101	10/31/93	2.4	J				
	E021SB091	021SB09101	10/31/93	1.7	J				
	E054SB001	054SB00101	11/09/95	5.6	=				
	E054SB002	054SB00201	11/09/95	3.3	=				
	E054SB003	054SB00301	11/08/95	4.5	=				
	E054SB004	054SB00401	11/17/95	11.9	=				
	E054SB005	054SB00501	11/17/95	9.3	=				
	E054SB006	054SB00601	11/20/95	8.2	=				
	E054SB007	054SB00701	11/20/95	6.2	=				
	E054SB008	054SB00801	11/20/95	9.2	=				
	E054SB009	054SB00901	11/21/95	2.2	=				
	E054SB010	054SB01001	11/21/95	11	=				
	E054SB011	054SB01101	11/21/95	3.1	=				
	E054SB012	054SB01201	11/21/95	6.9	=				
	E054SB013	054SB01301	11/21/95	2.3	=				

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations[c]
Arsenic	E054SB040	054SB04001	11/30/95	6	=		3.8	14.5	0.95 - 68
	E054SB041	054SB04101	09/17/02	5.19	=				
	E054SB042	054SB04201	09/17/02	4.54	=				
	E054SB043	054SB04301	09/17/02	4.84	=				
	E054SB044	054SB04401	09/17/02	4.4	=				
	E054SB045	054SB04501	09/17/02	4.84	=				
	E054SB046	054SB04601	09/17/02	3.79	=				
	E054SB047	054SB04701	09/17/02	1.51	J				
	E054SB052	054SB05201	09/17/02	3.9	=				
Beryllium	E021S0011	021S001101	10/24/93	0.76	=		410	31.5	0.13 - 1.6
	E021S0021	021S002101	10/24/93	1.6	=				
	E021S0031	021S003101	10/24/93	1.2	U				
	E021SB011	021SB01101	10/06/93	0.56	U				
	E021SB021	021SB02101	10/06/93	2.8	=				
	E021SB031	021SB03101	10/07/93	0.56	U				
	E021SB041	021SB04101	10/19/93	0.56	U				
	E021SB051	021SB05101	10/19/93	0.53	=				
	E021SB061	021SB06101	10/19/93	1.2	=				
	E021SB071	021SB07101	10/19/93	0.56	=				
	E021SB081	021SB08101	10/31/93	0.63	U				
	E021SB091	021SB09101	10/31/93	0.53	U				
	E054SB001	054SB00101	11/09/95	1.8	=				
	E054SB002	054SB00201	11/09/95	0.95	=				
	E054SB003	054SB00301	11/08/95	1.8	=				
	E054SB004	054SB00401	11/17/95	0.78	=				
	E054SB005	054SB00501	11/17/95	1.6	=				

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations[c]
Beryllium	E054SB032	054SB03201	11/27/95	0.27	J		410	31.5	0.13 - 1.6
	E054SB033	054SB03301	11/30/95	0.32	J				
	E054SB034	054SB03401	11/30/95	0.13	J				
	E054SB035	054SB03501	11/30/95	0.62	=				
	E054SB036	054SB03601	11/30/95	0.2	J				
	E054SB037	054SB03701	11/30/95	1.1	J				
	E054SB038	054SB03801	11/30/95	0.34	U				
	E054SB039	054SB03901	11/30/95	0.53	U				
	E054SB040	054SB04001	11/30/95	0.3	J				
	E054SB041	054SB04101	09/17/02	0.382	J				
	E054SB042	054SB04201	09/17/02	0.39	J				
	E054SB043	054SB04301	09/17/02	0.331	J				
	E054SB044	054SB04401	09/17/02	0.107	U				
	E054SB045	054SB04501	09/17/02	7.49	=				
	E054SB046	054SB04601	09/17/02	0.32	J				
	E054SB047	054SB04701	09/17/02	0.256	J				
	E054SB052	054SB05201	09/17/02	0.189	J				
Antimony	E054SB050	054SB05001	09/16/02	0.529	UJ	Mean [antimony] = 2.6	82	6.6	0.5 - 7.4
	E054SB049	054SB04901	09/16/02	4.47	J				
	E054SB051	054SB05101	09/16/02	0.58	UJ				
	E054SB048	054SB04801	09/16/02	2.07	J				
	E054SB045	054SB04501	09/17/02	**10.9**	J				
	E054SB044	054SB04401	09/17/02	0.565	UJ				
	E054SB046	054SB04601	09/17/02	0.523	UJ				
	E054SB042	054SB04201	09/17/02	0.519	UJ	Removed (CH2M-Jones)			

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations[c]
Antimony	E054SB041	054SB04101	09/17/02	5.9	J		82	6.6	0.5 - 7.4
	E054SB043	054SB04301	09/17/02	0.576	UJ	Mean [antimony] = 2.6			
	E054SB047	054SB04701	09/17/02	0.545	J				
	E054SB052	054SB05201	09/17/02	5.35	J				
Lead	E054SB050	054SB05001	09/16/02	75.6	=	Mean [lead] = 370	1,218	616	1.0 - 400
	E054SB049	054SB04901	09/16/02	**822**	=				
	E054SB051	054SB05101	09/16/02	110	=				
	E054SB048	054SB04801	09/16/02	365	=				
	E054SB045	054SB04501	09/17/02	**643**	J				
	E054SB044	054SB04401	09/17/02	8.21	J				
	E054SB046	054SB04601	09/17/02	118	J				
	E054SB042	054SB04201	09/17/02	135	J	Removed (CH2M-Jones)			
	E054SB041	054SB04101	09/17/02	**673**	J				
	E054SB043	054SB04301	09/17/02	215	J				
	E054SB047	054SB04701	09/17/02	47.4	J				
	E054SB052	054SB05201	09/17/02	**1,230**	J				
Mercury	E054SB049	054SB04901	09/16/02	0.635	J		61	13	0.03 - 2.7
	E054SB051	054SB05101	09/16/02	0.369	J				
	E054SB050	054SB05001	09/16/02	0.174	J				
	E054SB048	054SB04801	09/16/02	0.214	J				
	E054SB045	054SB04501	09/17/02	1.31	=				
	E054SB044	054SB04401	09/17/02	0.065	J				
	E054SB046	054SB04601	09/17/02	0.208	=				
	E054SB042	054SB04201	09/17/02	0.19	=	Removed (CH2M-Jones)			
	E054SB041	054SB04101	09/17/02	2.74	=				

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL[b] (DAF=10)	Range of Background Concentrations[c]
Mercury	E054SB043	054SB04301	09/17/02	0.271	=		61	13	0.03 - 2.7
	E054SB047	054SB04701	09/17/02	0.068	J				
	E054SB052	054SB05201	09/17/02	0.236	=				
Semivolatile Organic Compounds (SVOCs, µg/kg)									
Benzo(a)Anthracene	E054SB044	054SB04401	09/17/02	392	U		7,800	5,480	616
	E054SB046	054SB04601	09/17/02	370	U				
	E054SB045	054SB04501	09/17/02	383	U				
	E054SB041	054SB04101	09/17/02	292	J				
	E054SB043	054SB04301	09/17/02	410	U				
	E054SB042	054SB04201	09/17/02	**7,630**	=	Removed (CH2M-Jones)			
	E054SB047	054SB04701	09/17/02	377	U				
	E054SB052	054SB05201	09/17/02	**1,330**	J				
	E054SB059	054SB05901	12/20/02	324	=				
	E054SB056	054SB05601	12/20/02	698	=	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	**1,470**	=	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	193	=				
	E054SB060	054SB06001	01/23/03	102	=				
	E054SB061	054SB06101	01/23/03	850	=				
Benzo(b)Fluoranthene	E054SB044	054SB04401	09/17/02	392	U		7,800	18,800	608
	E054SB046	054SB04601	09/17/02	27.2	J				
	E054SB045	054SB04501	09/17/02	95.4	J				
	E054SB041	054SB04101	09/17/02	445	=				
	E054SB043	054SB04301	09/17/02	77.6	J				
	E054SB042	054SB04201	09/17/02	**12,000**	=	Removed (CH2M-Jones)			
	E054SB047	054SB04701	09/17/02	377	U				

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations[c]
Benzo(b)Fluoranthene	E054SB052	054SB05201	09/17/02	1,370	J		7,800	18,800	608
	E054SB059	054SB05901	12/20/02	1,100	=				
	E054SB056	054SB05601	12/20/02	**2,760**	=	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	2,060	=	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	324	=				
	E054SB060	054SB06001	01/23/03	230	=				
	E054SB061	054SB06101	01/23/03	1,430	=				
Benzo(k)Fluoranthene	E054SB044	054SB04401	09/17/02	392	U		78,000	188,000	596
	E054SB046	054SB04601	09/17/02	370	U				
	E054SB045	054SB04501	09/17/02	383	U				
	E054SB041	054SB04101	09/17/02	373	U				
	E054SB043	054SB04301	09/17/02	410	U				
	E054SB042	054SB04201	09/17/02	3,940	U	Removed (CH2M-Jones)			
	E054SB047	054SB04701	09/17/02	377	U				
	E054SB052	054SB05201	09/17/02	1,420	U				
	E054SB059	054SB05901	12/20/02	149	U				
	E054SB056	054SB05601	12/20/02	320	=	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	204	=	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	35	U				
	E054SB060	054SB06001	01/23/03	37.4	U				
	E054SB061	054SB06101	01/23/03	145	U				
Benzo(a)Pyrene	E054SB044	054SB04401	09/17/02	392	U		780	1,480	598
	E054SB046	054SB04601	09/17/02	21.4	J				
	E054SB045	054SB04501	09/17/02	45.5	J				
	E054SB041	054SB04101	09/17/02	314	J				

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL[b] (DAF=10)	Range of Background Concentrations[c]
Benzo(a)Pyrene	E054SB043	054SB04301	09/17/02	57	J		780	1,480	598
	E054SB042	054SB04201	09/17/02	**7,750**	=	Removed (CH2M-Jones)			
	E054SB047	054SB04701	09/17/02	377	U				
	E054SB052	054SB05201	09/17/02	750	J				
	E054SB059	054SB05901	12/20/02	334	=				
	E054SB056	054SB05601	12/20/02	**1,220**	=	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	**976**	=	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	150	=				
	E054SB060	054SB06001	01/23/03	127	=				
	E054SB061	054SB06101	01/23/03	659	=				
Chrysene	E054SB044	054SB04401	09/17/02	392	U		780,000	610,000	620
	E054SB046	054SB04601	09/17/02	370	U				
	E054SB045	054SB04501	09/17/02	383	U				
	E054SB041	054SB04101	09/17/02	296	J				
	E054SB043	054SB04301	09/17/02	56.7	J				
	E054SB042	054SB04201	09/17/02	7,490	=	Removed (CH2M-Jones)			
	E054SB047	054SB04701	09/17/02	377	U				
	E054SB052	054SB05201	09/17/02	1,310	J				
	E054SB059	054SB05901	12/20/02	330	=				
	E054SB056	054SB05601	12/20/02	897	=	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	1,350	=	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	185	=				
	E054SB060	054SB06001	01/23/03	143	=				
	E054SB061	054SB06101	01/23/03	906	=				
Dibenz(a,h)anthracene	E054SB044	054SB04401	09/17/02	392	U		780	2,740	525

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations[c]
Dibenz(a,h)anthracene	E054SB046	054SB04601	09/17/02	370	U		780	2,470	525
	E054SB045	054SB04501	09/17/02	383	U				
	E054SB041	054SB04101	09/17/02	373	U				
	E054SB043	054SB04301	09/17/02	410	U				
	E054SB042	054SB04201	09/17/02	**3,940**	U	Removed (CH2M-Jones)			
	E054SB047	054SB04701	09/17/02	377	U				
	E054SB052	054SB05201	09/17/02	98.5	J				
	E054SB059	054SB05901	12/20/02	149	U				
	E054SB056	054SB05601	12/20/02	36.5	UJ	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	35.3	UJ	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	35	U				
	E054SB060	054SB06001	01/23/03	37.4	U				
	E054SB061	054SB06101	01/23/03	145	U				
Indeno(1,2,3-c,d)pyrene	E054SB044	054SB04401	09/17/02	392	U		7,800	53,100	525
	E054SB046	054SB04601	09/17/02	370	U				
	E054SB045	054SB04501	09/17/02	383	U				
	E054SB041	054SB04101	09/17/02	288	J				
	E054SB043	054SB04301	09/17/02	410	U				
	E054SB042	054SB04201	09/17/02	4030	=	Removed (CH2M-Jones)			
	E054SB047	054SB04701	09/17/02	377	U				
	E054SB052	054SB05201	09/17/02	294	J				
	E054SB059	054SB05901	12/20/02	190	=				
	E054SB056	054SB05601	12/20/02	595	J	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	381	J	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	65.2	=				

TABLE 5-1
COC/COPC Concentrations in Surface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	Industrial RBC[a] (HI=0.1)	SSL [b] (DAF=10)	Range of Background Concentrations[c]
Indeno(1,2,3-c,d)pyrene	E054SB060	054SB06001	01/23/03	89.5	=		7,800	53,100	525
	E054SB061	054SB06101	01/23/03	293	=				
BEQs	E054SB041	054SB04101	09/17/02	603	J		NA	NA	1,304
	E054SB042	054SB04201	09/17/02	**12,095**	J	Removed (CH2M-Jones)			
	E054SB043	054SB04301	09/17/02	311	J				
	E054SB044	054SB04401	09/17/02	451	U				
	E054SB045	054SB04501	09/17/02	285	J				
	E054SB046	054SB04601	09/17/02	246	J				
	E054SB047	054SB04701	09/17/02	434	U				
	E054SB052	054SB05201	09/17/02	1150	J				
	E054SB056	054SB05601	12/20/02	**1,648**	J	Removed (CH2M-Jones)			
	E054SB057	054SB05701	12/20/02	**1,388**	J	Removed (CH2M-Jones)			
	E054SB058	054SB05801	12/20/02	226	J				
	E054SB059	054SB05901	12/20/02	572	J				
	E054SB060	054SB06001	01/23/03	188	J				
	E054SB061	054SB06101	01/23/03	990	J				

[a] Listed risk based concentrations (RBCs) for non-carcinogenic compounds are based on a hazard index (HI) of 0.1.
[b] Listed soil screening levels (SSLs) are either calculated site-specific SSLs or generic SSLs based on a dilution-attenuation factor (DAF) of 10 (1 for VOCs).
[c] Project Team Notebook and Instructions (CH2M-Jones 12/2001)or Background PAHs Study Report (CH2M-Jones, 2001).

U indicates that the compound was not detected. The reported value is the reporting limit.
UJ indicates that the compound was not detected. The reported value is an estimated reporting limit.
J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations[b]
Metals (mg/kg)								
Antimony	E054SB003	054SB00302	11/08/95	138	=	Mean [antimony] = 22.8	6.6	0.52 - 1.6
	E054SB002	054SB00202	11/09/95	4	J			
	E054SB001	054SB00102	11/09/95	4.8	J			
	E054SB013	054SB01302	11/21/95	2.9	J			
	E054SB014	054SB01402	11/21/95	2.5	J			
	E054SB011	054SB01102	11/21/95	0.82	J			
	E054SB012	054SB01202	11/21/95	0.46	U			
	E054SB010	054SB01002	11/21/95	0.45	U			
	E054SB009	054SB00902	11/21/95	0.46	U			
	E054SB017	054SB01702	11/27/95	0.54	J			
	E054SB018	054SB01802	11/27/95	0.46	J			
	E054SB015	054SB01502	11/27/95	1.2	J			
	E054SB016	054SB01602	11/27/95	4.2	J			
	E054SB021	054SB02102	11/27/95	0.51	U			
	E054SB022	054SB02202	11/27/95	0.49	J			
	E054SB019	054SB01902	11/27/95	1.4	J			
	E054SB020	054SB02002	11/27/95	0.83	J			
	E054SB023	054SB02302	11/27/95	2	J			
	E054SB032	054SB03202	11/27/95	6.4	J			
	E054SB026	054SB02602	11/28/95	0.53	UJ			
	E054SB024	054SB02402	11/28/95	0.44	UJ			
	E054SB025	054SB02502	11/28/95	0.47	UJ			
	E054SB029	054SB02902	11/28/95	0.65	J			
	E054SB030	054SB03002	11/28/95	27.4	J			
	E054SB028	054SB02802	11/28/95	0.5	UJ			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Antimony	E054SB027	054SB02702	11/28/95	11.3	J	Mean [antimony] = 22.8	6.6	0.52 - 1.6
	E054SB031	054SB03102	11/28/95	28.3	J			
	E054SB033	054SB03302	11/30/95	2.9	J			
	E054SB040	054SB04002	11/30/95	0.63	J			
	E054SB035	054SB03502	11/30/95	21.1	J			
	E054SB049	054SB04902	09/16/02	0.837	J			
	E054SB051	054SB05102	09/16/02	0.547	UJ			
	E054SB050	054SB05002	09/16/02	0.579	UJ			
	E054SB048	054SB04802	09/16/02	532	J			
	E054SB052	054SB05202	12/20/02	0.765	UJ			
Lead	E054SB003	054SB00302	11/08/95	3,430	=	Mean [lead] = 1,730	616	1.8 - 322
	E054SB002	054SB00202	11/09/95	332	J			
	E054SB001	054SB00102	11/09/95	112	J			
	E054SB005	054SB00502	11/17/95	16.3	J			
	E054SB004	054SB00402	11/17/95	2.6	J			
	E054SB006	054SB00602	11/20/95	28.4	J			
	E054SB008	054SB00802	11/20/95	15.4	J			
	E054SB007	054SB00702	11/20/95	21.7	J			
	E054SB013	054SB01302	11/21/95	349	=			
	E054SB014	054SB01402	11/21/95	165	=			
	E054SB011	054SB01102	11/21/95	80	=			
	E054SB012	054SB01202	11/21/95	20.1	=			
	E054SB010	054SB01002	11/21/95	21.6	=			
	E054SB009	054SB00902	11/21/95	23.9	=			
	E054SB017	054SB01702	11/27/95	76.4	J			
	E054SB018	054SB01802	11/27/95	20.6	J			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations[b]
Lead	E054SB015	054SB01502	11/27/95	66.4	J	Mean [lead] = 1,730	616	1.8 - 322
	E054SB016	054SB01602	11/27/95	161	J			
	E054SB021	054SB02102	11/27/95	4.5	J			
	E054SB022	054SB02202	11/27/95	12.9	J			
	E054SB019	054SB01902	11/27/95	123	J			
	E054SB020	054SB02002	11/27/95	66.2	J			
	E054SB023	054SB02302	11/27/95	85.8	J			
	E054SB032	054SB03202	11/27/95	1,330	J			
	E054SB026	054SB02602	11/28/95	12	=			
	E054SB024	054SB02402	11/28/95	14.3	=			
	E054SB025	054SB02502	11/28/95	32.4	=			
	E054SB029	054SB02902	11/28/95	150	=			
	E054SB030	054SB03002	11/28/95	6,480	=			
	E054SB028	054SB02802	11/28/95	3.9	=			
	E054SB027	054SB02702	11/28/95	267	=			
	E054SB031	054SB03102	11/28/95	9,480	=			
	E054SB033	054SB03302	11/30/95	1160	J			
	E054SB040	054SB04002	11/30/95	114	J			
	E054SB035	054SB03502	11/30/95	32,200	J			
	E054SB049	054SB04902	09/16/02	365	=			
	E054SB051	054SB05102	09/16/02	8.77	=			
	E054SB050	054SB05002	09/16/02	5.15	=			
	E054SB048	054SB04802	09/16/02	12,100	=			
	E054SB052	054SB05202	12/20/02	231	=			
Semivolatile Organic Compounds (SVOCs, µg/kg)								

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Benzo(a)Anthracene	E054SB003	054SB00302	11/08/95	920	U	Mean=12,267 Mean (w/o E054SB031)=486	5,480	627
	E054SB002	054SB00202	11/09/95	92	J			
	E054SB001	054SB00102	11/09/95	78	J			
	E054SB005	054SB00502	11/17/95	900	U			
	E054SB004	054SB00402	11/17/95	1000	U			
	E054SB006	054SB00602	11/20/95	880	U			
	E054SB008	054SB00802	11/20/95	1000	U			
	E054SB007	054SB00702	11/20/95	930	U			
	E054SB013	054SB01302	11/21/95	380	U			
	E054SB014	054SB01402	11/21/95	390	U			
	E054SB011	054SB01102	11/21/95	380	U			
	E054SB012	054SB01202	11/21/95	380	U			
	E054SB010	054SB01002	11/21/95	380	U			
	E054SB009	054SB00902	11/21/95	380	U			
	E054SB017	054SB01702	11/27/95	900	U			
	E054SB018	054SB01802	11/27/95	770	U			
	E054SB015	054SB01502	11/27/95	770	U			
	E054SB016	054SB01602	11/27/95	750	U			
	E054SB021	054SB02102	11/27/95	840	U			
	E054SB022	054SB02202	11/27/95	1400	=			
	E054SB019	054SB01902	11/27/95	780	U			
	E054SB020	054SB02002	11/27/95	770	U			
	E054SB023	054SB02302	11/27/95	1000	U			
	E054SB032	054SB03202	11/27/95	140	J			
	E054SB026	054SB02602	11/28/95	860	U			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations[b]
Benzo(a)Anthracene	E054SB024	054SB02402	11/28/95	470	J	Mean=12,267 Mean (w/o E054SB031)=486	5,480	627
	E054SB025	054SB02502	11/28/95	800	U			
	E054SB029	054SB02902	11/28/95	850	U			
	E054SB030	054SB03002	11/28/95	160	J			
	E054SB028	054SB02802	11/28/95	840	U			
	E054SB027	054SB02702	11/28/95	890	=			
	E054SB031	054SB03102	11/28/95	460,000	=	Resampled (054SB05302)		
	E054SB033	054SB03302	11/30/95	1,200	U			
	E054SB040	054SB04002	11/30/95	120	J			
	E054SB035	054SB03502	11/30/95	570	J	Resampled (054SB05402)		
	E054SB052	054SB05202	12/20/02	39.4	U			
	E054SB053	054SB05302	12/20/02	35,70	=	Re-sample of 054SB03102		
	E054SB054	054SB05402	12/20/02	38.5	U	Re-sample of 054SB03503		
	E054SB055	054SB05503	12/20/02	1,380	=			
Benzo(b)Fluoranthene	E054SB003	054SB00302	11/08/95	920	U	Mean=8,029	18,800	631
	E054SB002	054SB00202	11/09/95	110	J			
	E054SB001	054SB00102	11/09/95	76	J			
	E054SB005	054SB00502	11/17/95	900	U			
	E054SB004	054SB00402	11/17/95	1,000	U			
	E054SB006	054SB00602	11/20/95	880	U			
	E054SB008	054SB00802	11/20/95	1,000	U			
	E054SB007	054SB00702	11/20/95	930	U			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Benzo(b)Fluoranthene	E054SB013	054SB01302	11/21/95	380	U	Mean=8,029	18,800	631
	E054SB014	054SB01402	11/21/95	390	U			
	E054SB011	054SB01102	11/21/95	380	U			
	E054SB012	054SB01202	11/21/95	380	U			
	E054SB010	054SB01002	11/21/95	380	U			
	E054SB009	054SB00902	11/21/95	380	U			
	E054SB017	054SB01702	11/27/95	900	U			
	E054SB015	054SB01502	11/27/95	770	U			
	E054SB016	054SB01602	11/27/95	750	U			
	E054SB021	054SB02102	11/27/95	840	U			
	E054SB022	054SB02202	11/27/95	980	=			
	E054SB019	054SB01902	11/27/95	780	U			
	E054SB018	054SB01802	11/27/95	770	U			
	E054SB020	054SB02002	11/27/95	770	U			
	E054SB023	054SB02302	11/27/95	1000	U			
	E054SB032	054SB03202	11/27/95	860	U			
	E054SB026	054SB02602	11/28/95	860	U			
	E054SB024	054SB02402	11/28/95	210	J			
	E054SB025	054SB02502	11/28/95	800	U			
	E054SB029	054SB02902	11/28/95	130	J			
	E054SB030	054SB03002	11/28/95	340	J			
	E054SB028	054SB02802	11/28/95	840	U			
	E054SB027	054SB02702	11/28/95	560	J			
	E054SB031	054SB03102	11/28/95	290000	=	Resampled (054SB05302)		
	E054SB033	054SB03302	11/30/95	1200	U			
	E054SB040	054SB04002	11/30/95	120	J			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Benzo(b)Fluoranthene	E054SB035	054SB03502	11/30/95	1200	J	Resampled (054SB05402)	18,800	631
	E054SB052	054SB05202	12/20/02	196	=			
	E054SB053	054SB05302	12/20/02	6580	=	Re-sample of 054SB03102		
	E054SB054	054SB05402	12/20/02	38.5	U	Re-sample of 054SB03503		
	E054SB055	054SB05503	12/20/02	3070	=			
Benzo(k)Fluoranthene	E054SB003	054SB00302	11/08/95	920	U	Mean=5,993	188,000	631
	E054SB002	054SB00202	11/09/95	100	J			
	E054SB001	054SB00102	11/09/95	100	J			
	E054SB005	054SB00502	11/17/95	900	U			
	E054SB004	054SB00402	11/17/95	1,000	U			
	E054SB006	054SB00602	11/20/95	880	U			
	E054SB008	054SB00802	11/20/95	1000	U			
	E054SB007	054SB00702	11/20/95	930	U			
	E054SB013	054SB01302	11/21/95	380	U			
	E054SB014	054SB01402	11/21/95	390	U			
	E054SB011	054SB01102	11/21/95	380	U			
	E054SB012	054SB01202	11/21/95	380	U			
	E054SB010	054SB01002	11/21/95	380	U			
	E054SB009	054SB00902	11/21/95	380	U			
	E054SB017	054SB01702	11/27/95	900	U			
	E054SB015	054SB01502	11/27/95	770	U			
	E054SB016	054SB01602	11/27/95	750	U			
	E054SB021	054SB02102	11/27/95	840	U			
	E054SB022	054SB02202	11/27/95	1,000	=			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations[b]
Benzo(k)Fluoranthene	E054SB019	054SB01902	11/27/95	780	U	Mean=5,993	188,000	631
	E054SB018	054SB01802	11/27/95	770	U			
	E054SB020	054SB02002	11/27/95	770	U			
	E054SB023	054SB02302	11/27/95	1,000	U			
	E054SB032	054SB03202	11/27/95	860	U			
	E054SB026	054SB02602	11/28/95	860	U			
	E054SB024	054SB02402	11/28/95	160	J			
	E054SB025	054SB02502	11/28/95	800	U			
	E054SB029	054SB02902	11/28/95	100	J			
	E054SB030	054SB03002	11/28/95	820	U			
	E054SB028	054SB02802	11/28/95	840	U			
	E054SB027	054SB02702	11/28/95	580	J			
	E054SB031	054SB03102	11/28/95	220,000	=	Resampled (054SB05302)		
	E054SB033	054SB03302	11/30/95	1,200	U			
	E054SB040	054SB04002	11/30/95	100	J			
	E054SB035	054SB03502	11/30/95	650	J	Resampled (054SB05402)		
	E054SB052	054SB05202	12/20/02	39.4	U			
	E054SB053	054SB05302	12/20/02	704	=	Re-sample of 054SB03102		
	E054SB054	054SB05402	12/20/02	38.5	U	Re-sample of 054SB03503		
	E054SB055	054SB05503	12/20/02	258	=			
Benzo(a)Pyrene	E054SB003	054SB00302	11/08/95	920	U	Mean (w/o E054SB031) = 477.4	1,480	623
	E054SB002	054SB00202	11/09/95	70	J	Mean (all)=7,901		
	E054SB001	054SB00102	11/09/95	72	J			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Benzo(a)Pyrene	E054SB005	054SB00502	11/17/95	900	U	Mean (w/o E054SB031) = 477.4		
	E054SB004	054SB00402	11/17/95	1,000	U	Mean (all)=7,901	1,480	623
	E054SB006	054SB00602	11/20/95	880	U			
	E054SB008	054SB00802	11/20/95	1,000	U			
	E054SB007	054SB00702	11/20/95	930	U			
	E054SB013	054SB01302	11/21/95	380	U			
	E054SB014	054SB01402	11/21/95	390	U			
	E054SB011	054SB01102	11/21/95	380	U			
	E054SB012	054SB01202	11/21/95	380	U			
	E054SB010	054SB01002	11/21/95	380	U			
	E054SB009	054SB00902	11/21/95	380	U			
	E054SB017	054SB01702	11/27/95	900	U			
	E054SB015	054SB01502	11/27/95	770	U			
	E054SB016	054SB01602	11/27/95	750	U			
	E054SB021	054SB02102	11/27/95	840	U			
	E054SB018	054SB01802	11/27/95	770	U			
	E054SB022	054SB02202	11/27/95	1,200	=			
	E054SB019	054SB01902	11/27/95	780	U			
	E054SB020	054SB02002	11/27/95	770	U			
	E054SB023	054SB02302	11/27/95	1,000	U			
	E054SB032	054SB03202	11/27/95	860	U			
	E054SB026	054SB02602	11/28/95	860	U			
	E054SB024	054SB02402	11/28/95	160	J			
	E054SB025	054SB02502	11/28/95	800	U			
	E054SB029	054SB02902	11/28/95	160	J			
	E054SB030	054SB03002	11/28/95	120	J			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Benzo(a)Pyrene	E054SB028	054SB02802	11/28/95	840	U		1,480	623
	E054SB027	054SB02702	11/28/95	490	J			
	E054SB031	054SB03102	11/28/95	290,000	=	Resampled (054SB05302)		
	E054SB033	054SB03302	11/30/95	1200	U			
	E054SB040	054SB04002	11/30/95	120	J			
	E054SB035	054SB03502	11/30/95	950	J	Resampled (054SB05402)		
	E054SB052	054SB05202	12/20/02	39.4	U			
	E054SB053	054SB05302	12/20/02	3680	=	Re-sample of 054SB03102		
	E054SB054	054SB05402	12/20/02	38.5	U	Re-sample of 054SB03503		
	E054SB055	054SB05503	12/20/02	1,550	=			
Chrysene	E054SB003	054SB00302	11/08/95	920	U		610,000	616
	E054SB002	054SB00202	11/09/95	110	J			
	E054SB001	054SB00102	11/09/95	80	J			
	E054SB005	054SB00502	11/17/95	900	U			
	E054SB004	054SB00402	11/17/95	1,000	U			
	E054SB006	054SB00602	11/20/95	880	U			
	E054SB008	054SB00802	11/20/95	1,000	U			
	E054SB007	054SB00702	11/20/95	930	U			
	E054SB013	054SB01302	11/21/95	380	U			
	E054SB014	054SB01402	11/21/95	390	U			
	E054SB011	054SB01102	11/21/95	380	U			
	E054SB012	054SB01202	11/21/95	380	U			
	E054SB010	054SB01002	11/21/95	380	U			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Chrysene	E054SB009	054SB00902	11/21/95	380	U		610,000	616
	E054SB017	054SB01702	11/27/95	130	J			
	E054SB015	054SB01502	11/27/95	770	U			
	E054SB016	054SB01602	11/27/95	750	U			
	E054SB021	054SB02102	11/27/95	840	U			
	E054SB022	054SB02202	11/27/95	1,500	=			
	E054SB019	054SB01902	11/27/95	780	U			
	E054SB018	054SB01802	11/27/95	770	U			
	E054SB020	054SB02002	11/27/95	770	U			
	E054SB023	054SB02302	11/27/95	1,000	U			
	E054SB032	054SB03202	11/27/95	170	J			
	E054SB026	054SB02602	11/28/95	860	U			
	E054SB024	054SB02402	11/28/95	320	J			
	E054SB025	054SB02502	11/28/95	800	U			
	E054SB029	054SB02902	11/28/95	850	U			
	E054SB030	054SB03002	11/28/95	230	J			
	E054SB028	054SB02802	11/28/95	840	U			
	E054SB027	054SB02702	11/28/95	890	=			
	E054SB031	054SB03102	11/28/95	360,000	=	Resampled (054SB05302)		
	E054SB033	054SB03302	11/30/95	1,200	U			
	E054SB040	054SB04002	11/30/95	100	J			
	E054SB035	054SB03502	11/30/95	580	J	Resampled (054SB05402)		
	E054SB052	054SB05202	12/20/02	36	J			
	E054SB053	054SB05302	12/20/02	3,540	=	Re-sample of 054SB03102		

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Chrysene	E054SB054	054SB05402	12/20/02	38.5	U	Re-sample of 054SB03503	610,000	616
	E054SB055	054SB05503	12/20/02	1,450	=			
Dibenz(a,h)anthracene	E054SB003	054SB00302	11/08/95	920	U	Mean=2,715	2,740	586
	E054SB002	054SB00202	11/09/95	440	U			
	E054SB001	054SB00102	11/09/95	390	U			
	E054SB005	054SB00502	11/17/95	900	U			
	E054SB004	054SB00402	11/17/95	1,000	U			
	E054SB006	054SB00602	11/20/95	880	U			
	E054SB008	054SB00802	11/20/95	1,000	U			
	E054SB007	054SB00702	11/20/95	930	U			
	E054SB013	054SB01302	11/21/95	380	U			
	E054SB014	054SB01402	11/21/95	390	U			
	E054SB011	054SB01102	11/21/95	380	U			
	E054SB012	054SB01202	11/21/95	380	U			
	E054SB010	054SB01002	11/21/95	380	U			
	E054SB009	054SB00902	11/21/95	380	U			
	E054SB017	054SB01702	11/27/95	900	U			
	E054SB015	054SB01502	11/27/95	770	U			
	E054SB016	054SB01602	11/27/95	750	U			
	E054SB021	054SB02102	11/27/95	840	U			
	E054SB022	054SB02202	11/27/95	310	J			
	E054SB019	054SB01902	11/27/95	780	U			
	E054SB018	054SB01802	11/27/95	770	U			
	E054SB020	054SB02002	11/27/95	770	U			
	E054SB023	054SB02302	11/27/95	1,000	U			
	E054SB032	054SB03202	11/27/95	860	U			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations[b]
Dibenz(a,h)anthracene	E054SB026	054SB02602	11/28/95	860	U	Mean=2,715	2,740	586
	E054SB024	054SB02402	11/28/95	840	U			
	E054SB025	054SB02502	11/28/95	800	U			
	E054SB029	054SB02902	11/28/95	850	U			
	E054SB030	054SB03002	11/28/95	820	U			
	E054SB028	054SB02802	11/28/95	840	U			
	E054SB027	054SB02702	11/28/95	810	U			
	E054SB031	054SB03102	11/28/95	93,000	=	Resampled (054SB05302)		
	E054SB033	054SB03302	11/30/95	1,200	U			
	E054SB040	054SB04002	11/30/95	750	U			
	E054SB035	054SB03502	11/30/95	220	J	Resampled (054SB05402)		
	E054SB052	054SB05202	12/20/02	39.4	UJ			
	E054SB053	054SB05302	12/20/02	174	UJ	Re-sample of 054SB03102		
	E054SB054	054SB05402	12/20/02	38.5	U	Re-sample of 054SB03503		
	E054SB055	054SB05503	12/20/02	162	UJ			
Indeno(1,2,3-c,d)pyrene	E054SB003	054SB00302	11/08/95	920	U	Mean=4,235	53,100	592
	E054SB002	054SB00202	11/09/95	52	J			
	E054SB001	054SB00102	11/09/95	44	J			
	E054SB005	054SB00502	11/17/95	900	U			
	E054SB004	054SB00402	11/17/95	1,000	U			
	E054SB006	054SB00602	11/20/95	880	U			
	E054SB008	054SB00802	11/20/95	1,000	U			
	E054SB007	054SB00702	11/20/95	930	U			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Indeno(1,2,3-c,d)pyrene	E054SB013	054SB01302	11/21/95	380	U	Mean=4,235	53,100	592
	E054SB014	054SB01402	11/21/95	390	U			
	E054SB011	054SB01102	11/21/95	380	U			
	E054SB012	054SB01202	11/21/95	380	U			
	E054SB010	054SB01002	11/21/95	380	U			
	E054SB009	054SB00902	11/21/95	380	U			
	E054SB017	054SB01702	11/27/95	900	U			
	E054SB015	054SB01502	11/27/95	770	U			
	E054SB016	054SB01602	11/27/95	750	U			
	E054SB021	054SB02102	11/27/95	840	U			
	E054SB022	054SB02202	11/27/95	730	J			
	E054SB018	054SB01802	11/27/95	770	U			
	E054SB020	054SB02002	11/27/95	770	U			
	E054SB019	054SB01902	11/27/95	780	U			
	E054SB023	054SB02302	11/27/95	1,000	U			
	E054SB032	054SB03202	11/27/95	860	U			
	E054SB025	054SB02502	11/28/95	800	U			
	E054SB026	054SB02602	11/28/95	860	U			
	E054SB024	054SB02402	11/28/95	840	U			
	E054SB029	054SB02902	11/28/95	850	U			
	E054SB030	054SB03002	11/28/95	85	J			
	E054SB028	054SB02802	11/28/95	840	U			
	E054SB027	054SB02702	11/28/95	270	J			
	E054SB031	054SB03102	11/28/95	150,000	=	Resampled (054SB05302)		
	E054SB033	054SB03302	11/30/95	1,200	U			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations [b]
Indeno(1,2,3-c,d)pyrene	E054SB035	054SB03502	11/30/95	1,200	J	Resampled (054SB05402)	53,100	592
	E054SB040	054SB04002	11/30/95	130	J			
	E054SB052	054SB05202	12/20/02	39.4	UJ			
	E054SB053	054SB05302	12/20/02	1,410	J	Re-sample of 054SB03102		
	E054SB054	054SB05402	12/20/02	38.5	U	Re-sample of 054SB03503		
	E054SB055	054SB05503	12/20/02	832	J			
BEQs	E054SB001	054SB00102	11/09/1995	288	=		NA	1,400
	E054SB002	054SB00202	11/09/1995	317	=			
	E054SB003	054SB00302	11/08/1995	1,063	U			
	E054SB004	054SB00402	11/17/1995	1,156	U			
	E054SB005	054SB00502	11/17/1995	1,040	U			
	E054SB006	054SB00602	11/20/1995	1,017	U			
	E054SB007	054SB00702	11/20/1995	1,075	U			
	E054SB008	054SB00802	11/20/1995	1,156	U			
	E054SB009	054SB00902	11/21/1995	439	U			
	E054SB010	054SB01002	11/21/1995	439	U			
	E054SB011	054SB01102	11/21/1995	439	U			
	E054SB012	054SB01202	11/21/1995	439	U			
	E054SB013	054SB01302	11/21/1995	439	U			
	E054SB014	054SB01402	11/21/1995	451	U			
	E054SB015	054SB01502	11/27/1995	890	U			
	E054SB016	054SB01602	11/27/1995	867	U			
	E054SB017	054SB01702	11/27/1995	1,040	=			
	E054SB018	054SB01802	11/27/1995	890	U			

TABLE 5-2
COC/COPC Concentrations in Subsurface Soil Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration	Qualifier	Notes	SSL [a] (DAF=10)	Range of Background Concentrations[b]

U indicates that the compound was not detected. The reported value is the reporting limit.
UJ indicates that the compound was not detected. The reported value is an estimated reporting limit.
J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Antimony		054GW002M2 (unfiltered)	09/30/02	**24.9**	J	6	NA	2 - 5
		054GW002M2 (filtered)	09/30/02	**18.1**	J			
	E054GW003	054GW00301	04/12/96	4	U			
		054GW00302	08/08/96	2.1	U			
Arsenic[ca]	E021GW001	021GW00101	04/16/96	5	U	50	NA	3 - 316
		021GW00102	08/08/96	2.5	U			
		021GW001RM2 (unfiltered)	09/03/02	3.97	U			
		021GW001RM2 (filtered)	09/03/02	3.97	U			
	E021GW002	021GW00201	04/16/96	19.5	=			
		021GW00202	08/07/96	26.1	=			
		021GW002RM2 (unfiltered)	09/30/02	35.6	=			
		021GW002RM2 (filtered)	09/30/02	14.2	=			
	E021GW003	021GW00301	04/16/96	5	U			
		021GW00302	08/07/96	2.6	J			
		021GW00303	12/04/96	2.5	U			
		021GW00304	02/26/97	2.1	UJ			
	E021GW004	021GW004M2 (unfiltered)	10/01/02	20.8	=			
		021GW004M2 (filtered)	10/01/02	7.14	J			
	E054GW001	054GW00101	04/12/96	5	U			
		054GW00102	08/09/96	2.5	U			

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Arsenic[ca]	E054GW002	054GW00201	04/16/96	5	U	50	NA	3 - 316
		054GW00202	08/08/96	3.3	U			
		054GW00203	12/04/96	3.7	J			
		054GW00204	02/27/97	2.1	UJ			
		054GW002M2 (unfiltered)	09/30/02	3.97	U			
		054GW002M2 (filtered)	09/30/02	3.97	U			
	E054GW003	054GW00301	04/12/96	6	J			
		054GW00302	08/08/96	4.2	U			
Lead	E021GW001	021GW00101	04/16/96	3	U	15	NA	2 - 47
		021GW00102	08/08/96	1.7	U			
		021GW001RM2 (unfiltered)	09/03/02	12.8	=			
		021GW001RM2 (filtered)	09/03/02	3.99	U			
	E021GW002	021GW00201	04/16/96	7.9	=			
		021GW00202	08/07/96	13.1	J			
		021GW002RM2 (unfiltered)	09/30/02	3.97	U			
		021GW002RM2 (unfiltered)	09/30/02	1.46	U			
	E021GW003	021GW00301	04/16/96	3	U			
		021GW00302	08/07/96	2.8	J			
		021GW00303	12/04/96	1.7	U			
		021GW00304	02/26/97	1.6	J			
	E021GW004	021GW004M2 (unfiltered)	10/01/02	2.49	U			

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Lead		021GW004M2 (filtered)	10/01/02	2.15	U	15	NA	2 - 47
	E054GW001	054GW00101	04/12/96	3	U			
		054GW00102	08/09/96	1.7	U			
	E054GW002	054GW00201	04/16/96	9	J			
		054GW00202	08/08/96	10.6	=			
		054GW00203	12/04/96	4.2	U			
		054GW00204	02/27/97	3.3	=			
		054GW002M2 (unfiltered)	09/30/02	**258**	=			
		054GW002M2 (filtered)	09/30/02	1.49	U			
	E054GW003	054GW00301	04/12/96	5.5	=			
		054GW00302	08/08/96	1.7	U			
Nickel	E021GW001	021GW00101	04/16/96	1	U	NA	73	0.9 - 17
		021GW00102	08/08/96	1.9	U			
		021GW001RM2 (unfiltered)	09/03/02	0.837	U			
		021GW001RM2 (filtered)	09/03/02	0.837	U			
	E021GW002	021GW00201	04/16/96	1.4	J			
		021GW00202	08/07/96	9.1	J			
		021GW002RM2 (unfiltered)	09/30/02	2.29	U			
		021GW002RM2 (filtered)	09/30/02	2.69	U			
	E021GW003	021GW00301	04/16/96	1	U			

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Nickel		021GW00302	08/07/96	2.8	J	NA	73	0.9 - 17
		021GW00303	12/04/96	30.5	J			
		021GW00304	02/26/97	1.5	J			
	E021GW004	021GW004M2 (unfiltered)	10/01/02	0.837	U			
		021GW004M2 (filtered)	10/01/02	0.872	U			
	E054GW001	054GW00101	04/12/96	1	U			
		054GW00102	08/09/96	0.8	U			
	E054GW002	054GW00201	04/16/96	1.7	J			
		054GW00202	08/08/96	2.9	U			
		054GW00203	12/04/96	**129**	=			
		054GW00204	02/27/97	7.2	J			
		054GW002M2 (unfiltered)	09/30/02	12.3	J			
		054GW002M2 (filtered)	09/30/02	10.9	J			
	E054GW003	054GW00301	04/12/96	2.8	J			
		054GW00302	08/08/96	2.3	U			
Thallium	E021GW001	021GW00101	04/16/96	5	U	2	NA	3.0 - 6.0
		021GW00102	08/08/96	4.6	U			
		021GW001RM2 (unfiltered)	09/03/02	**14.3**	=			
		021GW001RM2 (filtered)	09/03/02	**15.7**	=			
	E021GW002	021GW00201	04/16/96	5	U			
		021GW00202	08/07/96	2.7	U			

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Thallium		021GW002RM2 (unfiltered)	09/30/02	4.99	U	2	NA	3.0 - 6.0
		021GW002RM2 (filtered)	09/30/02	4.99	U			
	E021GW003	021GW00301	04/16/96	5	U			
		021GW00302	08/07/96	2.7	U			
		021GW00303	12/04/96	**3.2**	J			
		021GW00304	02/26/97	5	U			
	E021GW004	021GW004M2 (unfiltered)	10/01/02	4.99	U			
		021GW004M2 (filtered)	10/01/02	4.99	U			
	E054GW001	054GW00101	04/12/96	5	U			
		054GW00102	08/09/96	2.7	U			
	E054GW002	054GW00201	04/16/96	**5**	J			
		054GW00202	08/08/96	4.8	U			
		054GW00203	12/04/96	**3.6**	J			
		054GW00204	02/27/97	5	U			
		054GW002M2 (unfiltered)	09/30/02	4.99	U			
		054GW002M2 (filtered)	09/30/02	4.99	U			
	E054GW003	054GW00301	04/12/96	5	U			
		054GW00302	08/08/96	2.7	U			
Semivolatile Organic Compounds								
Benzo(a)Anthracene[ca]	E021GW001	021GW00101	04/16/96	10	U	NA	0.092	NA
		021GW001M3	12/20/02	0.99	U			

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Benzo(a)Anthracene[ca]	E021GW002	021GW00201	04/16/96	10	U	NA	0.092	NA
	E021GW003	021GW00301	04/16/96	10	U			
	E021GW004	021GW004M3	12/20/02	1	U			
	E054GW001	054GW00101	04/12/96	10	UJ			
	E054GW002	054GW00201	04/16/96	10	U			
		054HW00201	04/16/96	10	U			
	E054GW003	054GW00301	04/12/96	10	U			
Benzo(a)Pyrene[ca]	E021GW001	021GW00101	04/16/96	10	U	NA	0.0092	NA
		021GW001M3	12/20/02	0.99	U			
	E021GW002	021GW00201	04/16/96	10	U			
	E021GW003	021GW00301	04/16/96	10	U			
	E021GW004	021GW004M3	12/20/02	1	U			
	E054GW001	054GW00101	04/12/96	10	UJ			
	E054GW002	054GW00201	04/16/96	10	U			
		054HW00201	04/16/96	10	U			
	E054GW003	054GW00301	04/12/96	10	U			
Benzo(b)Fluoranthene[ca]	E021GW001	021GW00101	04/16/96	10	U	NA	0.092	NA
		021GW001M3	12/20/02	0.99	U			
	E021GW002	021GW00201	04/16/96	10	U			
	E021GW003	021GW00301	04/16/96	10	U			
	E021GW004	021GW004M3	12/20/02	1	U			
	E054GW001	054GW00101	04/12/96	10	UJ			
	E054GW002	054GW00201	04/16/96	10	U			
		054HW00201	04/16/96	10	U			
	E054GW003	054GW00301	04/12/96	10	U			
Benzo(k)Fluoranthene[ca]	E021GW001	021GW00101	04/16/96	10	U	NA	0.92	NA

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Benzo(k)Fluoranthene[ca]		021GW001M3	12/20/02	0.99	U	NA	0.92	NA
	E021GW002	021GW00201	04/16/96	10	U			
	E021GW003	021GW00301	04/16/96	10	U			
	E021GW004	021GW004M3	12/20/02	1	U			
	E054GW001	054GW00101	04/12/96	10	UJ			
	E054GW002	054GW00201	04/16/96	10	U			
		054HW00201	04/16/96	10	U			
	E054GW003	054GW00301	04/12/96	10	UJ			
Chrysene[ca]	E021GW001	021GW00101	04/16/96	10	U	NA	9.2	NA
		021GW001M3	12/20/02	0.99	U			
	E021GW002	021GW00201	04/16/96	10	U			
	E021GW003	021GW00301	04/16/96	10	U			
	E021GW004	021GW004M3	12/20/02	1	U			
	E054GW001	054GW00101	04/12/96	10	UJ			
	E054GW002	054GW00201	04/16/96	10	U			
		054HW00201	04/16/96	10	U			
	E054GW003	054GW00301	04/12/96	10	U			
Dibenz(a,h)anthracene[ca]	E021GW001	021GW00101	04/16/96	10	U	NA	0.0092	NA
		021GW001M3	12/20/02	0.99	U			
	E021GW002	021GW00201	04/16/96	10	U			
	E021GW003	021GW00301	04/16/96	10	U			
	E021GW004	021GW004M3	12/20/02	1	U			
	E054GW001	054GW00101	04/12/96	10	UJ			
	E054GW002	054GW00201	04/16/96	10	U			
		054HW00201	04/16/96	10	U			
	E054GW003	054GW00301	04/12/96	10	U			

TABLE 5-3
COC/COPC Concentrations in Groundwater Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (µg/L)	Qualifier	MCL[a]	Tap Water RBC[b] (HI=0.1)	Zone E Range of Background Concentrations[c]
Indeno(1,2,3-c,d)pyrene[ca]	E021GW001	021GW00101	04/16/96	10	U	NA	0.092	NA
		021GW001M3	12/20/02	0.99	UJ			
	E021GW002	021GW00201	04/16/96	10	U			
	E021GW003	021GW00301	04/16/96	10	U			
	E021GW004	021GW004M3	12/20/02	1	UJ			
	E054GW001	054GW00101	04/12/96	10	UJ			
	E054GW002	054GW00201	04/16/96	10	U			
		054HW00201	04/16/96	10	U			
	E054GW003	054GW00301	04/12/96	10	UJ			

[a] National Primary Drinking Water Standards (EPA, 3/2001).
[b] U.S. EPA Region III RBC Table (hazard index [HI] = 0.1 for noncarcinogens, 10/2000).
[c] Project Team Notebook and Instructions (CH2M-Jones 12/2001).
[ca] Indicates that the compound is classified as a carcinogen.

U indicates that the compound was not detected. The reported value is the reporting limit.
UJ indicates that the compound was not detected. The reported value is an estimated reporting limit.
J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.
NA indicates that the information is not available or not applicable.
EN indicates that the chemical is an essential nutrient.

TABLE 5-4
SSL Calculations
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

							Parameter	Benzo(a) anthracene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(a) pyrene	Chrysene	Dibenz(a,h) anthracene	Ideno(1,2,3-c,d) ptrene	Methylene Chloride
Chemical Specific Input Parameters															
Cw =	Target groundwater concentration MCL (mg/L)							9.20E-05	9.20E-05	9.20E-04	9.20E-06	9.20E-03	9.20E-06	9.20E-05	5.00E-03
H =	Henry's Law Constant, dimensionless							1.37E-04	4.55E-03	3.40E-05	4.63E-05	2.88E-03	6.03E-07	6.56E-05	8.98E-02
Kd =	Soil-water sorption coefficient (cm3 water / g soil = L/kg) = Koc x foc where							1.32E+04	4.55E+04	4.55E+04	3.59E+04	1.47E+04	6.62E+04	1.28E+05	3.70E-01
	Koc = organic carbon-water sorption coefficient, (cm3 (ml) water) / (g soluble organic carbon)							3.58E+05	1.23E+06	1.23E+06	9.69E+05	3.98E+05	1.79E+06	3.47E+06	1.00E+01
	Foc = Fraction of organic content, dimensionless						0.037								
Site Specific Input Parameters															
Sw =	Width of Source Parallel to Groundwater Flow Direction	(impacted soil zone)	27.4	m	90	ft									
da =	Aquifer Thickness		7.01	m	23	ft									
d =	Groundwater Mixing Zone thickness	(paved)	3.0	m	9.8	ft									
		(unpaved)	3.9	m	12.9	ft									
I =	Groundwater Gradient			1.0E-02 (unitless)											
Ks =	Saturated Hydraulic Conductivity		333.7	m/yr	1095.0	ft/yr									
θw =	Volumetric Water Content of Soil Pore Space		0.3	cm^3_{vapor}/cm^3_{soil}	0.3	in^3_{vapor}/in^3_{soil}									
θv =	Volumetric Vapor Content of Soil Pore Space		0.15	cm^3_{vapor}/cm^3_{soil}	0.15	in^3_{vapor}/in^3_{soil}									
ρs =	Soil Bulk Density		1.5	g/cm^3	93.64	lb_m/ft^3									
qi =	Water Infiltration Rate	(paved)	0.0086	m/yr	0.0283	ft/yr									
		(unpaved)	0.14	m/yr	0.4500	ft/yr									
Partition Term, Cw/Csoil, (L/kg)								1.32E+04	4.55E+04	4.55E+04	3.59E+04	1.47E+04	6.62E+04	1.28E+05	5.79E-01
Dilution Term, dimensionless		(paved)						4.29E+01	4.29E+01	4.29E+01	4.29E+01	4.29E+01	4.29E+01	4.29E+01	4.29E+01
		(unpaved)						4.50E+00	4.50E+00	4.50E+00	4.50E+00	4.50E+00	4.50E+00	4.50E+00	4.50E+00
Csoil/Cw =Partition term * Dilution term (mg/kg / mg/L) = L/kg		(paved)						5.68E+05	1.95E+06	1.95E+06	1.54E+06	6.32E+05	2.84E+06	5.51E+06	2.48E+01
		(unpaved)						5.96E+04	2.05E+05	2.05E+05	1.61E+05	6.63E+04	2.98E+05	5.78E+05	2.60E+00
Calculated Site Specific Target Level for Soil															
C_{soil} calculated source soil concentration (SSL, mg/kg) Cw*(partion term)*(dilution term)							(paved)	52.3	180	1796	14.1	5811	26.1	507	0.12
							(unpaved)	5.48	18.8	188	1.48	610	2.74	53.1	0.013

$$\frac{C_{soil}}{C_w} = \left(\frac{\theta_w + K_d\rho_s + H\theta_v}{\rho_s}\right)\left(\frac{K_s i d + q_i S_w}{q_i S_w}\right)$$

Cwt is the MCL from EPA National Drinking Water Standards (March 2001)or US EPA Region III RBCs (October, 2000).
H from Table 36 of the Soil Screening Guidance; Technical Background Document (EPA, 1996) or Table 3-2 of the Toxicological Profile for Polychlorinated Biphenyls (Aroclor-1260, U.S. Department of Health & Human Services, 1995) adjusted to the dimensionless form (x 41).
ks = koc x foc.
koc from Table 39 of the Soil Screening Guidance; Technical Background Document (EPA, 1996) or from the Superfund Chemical Data Matrix (Aroclor-1260).
foc calculated as the mean foc from TOC measurements from Zone E.
Sw is the estimated source length along the groundwater flow path (90 ft).
d is calculated as $d = (0.0112\ L^2)^{0.5} + da\{1 - e^{[-L\ qi/Ks\ da]}\}$ or da, whichever is less.
da is based on the groundwater elevation in the GIS (3 ft msl) - the top of Ashley elevation (-20 ft, GIS).
I is calculated from based on distance (100 ft) between 1.5- and 2.5- foot shallow groundwater contours from the May 14, 2002 measurements (-0.01, CH2M-Jones, 5/14,2002)
Ks Based on CH2MHill's hydraulic conductivity theme in the GIS (3 ft/d).
θw is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
θv is calculated as total porosity (0.45, assumed) - θw (0.3) = 0.15.
ρs is the default value presented in the Soil Screening Guidance: User's Guide (EPA, 1996)
qi are derived values (5.4 in/yr, unpaved and 0.3 in/yr paved) based on annual precipitation, evapo-transportation, and runoff coefficient values for the Charleston area.

TABLE 5-5
VOCs Detected in RFI Samples Compared Against SSLs (DAF=1)
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Chemical	Station ID	Sample ID	Date Collected	Concentration (mg/kg)	Qualifier	SSL[a] (DAF=1)	SSL (Site-Specific)
Surface Soil							
Acetone	E054SB034	054SB03401	11/30/95	0.035	J	0.8	NA
Chlorobenzene	E021S0011	021S001101	10/24/93	0.0064	=	0.07	NA
	E021SB021	021SB02101	10/06/93	0.013	=		
	E021SB031	021SB03101	10/07/93	0.014	=		
	E021SB041	021SB04101	10/19/93	0.0044	J		
	E021SB051	021SB05101	10/19/93	0.016	=		
	E021SB061	021SB06101	10/19/93	0.004	J		
	E021SB071	021SB07101	10/19/93	0.03	=		
	E021SB091	021SB09101	10/31/93	0.01	=		
Methylene Chloride	E021SB031	021SB03101	10/07/93	0.0061	=	0.001	0.013
Toluene	E021SB031	021SB03101	10/07/93	0.0072	=	0.6	NA
	E021SB071	021SB07101	10/19/93	0.0036	J		
Subsurface Soil							
Acetone	E054SB011	054SB01102	11/21/95	0.079	J	0.8	NA
	E054SB012	054SB01202	11/21/95	0.033	=		
	E054SB013	054SB01302	11/21/95	0.17	=		
	E054SB014	054SB01402	11/21/95	0.099	=		
	E054SB024	054SB02402	11/28/95	0.03	=		
	E054SB033	054SB03302	11/30/95	0.035	J		
Methyl ethyl ketone (2-Butanone)	E054SB014	054SB01402	11/21/95	0.006	J	0.4[b]	NA

[a] Listed SSLs are from the U.S. EPA Soil Screening Guidance (5/1996) based on DAF of 10, unless otherwise noted.
[b] SSL is from EPA Region III RBC Table (10/2000) and based on a DAF of 10.

J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.

Bold values indicate exceedance of the generic SSL (DAF=10).
Boxed values indicate exceedance of the site-specific SSL (unpaved).

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 21 and 54 together and recommended a CMS to address surface soil and shallow groundwater at the sites. Responses to SCDHEC comments on the RFI report are attached as Appendix F. With this report addendum, the RFI is considered to be complete.

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 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.

These constituents were discussed in Section 5.0. No detected concentrations of arsenic exceeded the MCL of 50 $\mu g/L$. Antimony and thallium were identified as groundwater COCs for SWMUs 21 and 54 and their presence will be evaluated in a CMS (see Section 9). Therefore, additional discussion of inorganics in groundwater at this site is not warranted.

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

There are no data suggesting that there were any connections from operations at this site to the sanitary sewer. Therefore, further evaluation of this issue is not warranted.

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

No direct connections from SWMUs 21 and 54 to the storm sewers are known to exist. Therefore, further evaluation of this issue is not warranted.

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

There are no railroad lines at SWMUs 21 and 54. Therefore, no linkage with the railroad lines exists and further evaluation of this issue is not warranted.

6.6 Potential Migration Pathways to Surface Water Bodies at the CNC

The nearest surface water body to SWMUs 21 and 54 is the Cooper River, which is adjacent to the site. Four sediment samples were collected as part of the RFI investigation at SWMUs 21 and 54 to determine if COCs/COPCs were potentially migrating off-site. The analytical results for detected compounds in the samples suggested that chemicals detected in site soil may be migrating to the Cooper River and that sediment may have been impacted by site activities. Further evaluation of this issue is being addressed in the Zone J RFI by the Navy/EnSafe team.

6.7 Potential Contamination in Oil/Water Separators (OWSs)

There are no OWSs associated with SWMUs 21 and 54. In addition, there is no reference to an OWS at the site in the Oil/Water Separator Data report, prepared by the Department of the Navy (September 2000). Therefore, further evaluation of this issue is not warranted.

6.8 Land Use Controls (LUCs)

SWMUs 21 and 54 are planned for future industrial use. The evaluation presented in this RFIRA concludes that the site is suitable for this purpose. Therefore SWMUs 21 and 54 will have LUCs applied as part of the corrective measures process. At a minimum, these LUCs are expected to include restrictions against residential land use.

Section 7.0

7.0 Interim Measure Completion Report

7.1 Pre-excavation Sampling and Contaminant Delineation

The *Zone E RFI Report, Revision 0* (EnSafe, 1997) identified arsenic, BEQs, and beryllium as COCs for SWMUs 21 and 54. Following the RFI, the DET performed an IM that resulted in removal of much of the surface and subsurface soil at the site(s). In order to determine current soil and groundwater conditions, and to collect data for SSL calculations, CH2M-Jones developed a SAP to address these data needs in August 2002. The SAP was reviewed by SCDHEC and comments issued on August 27, 2002. Responses to SCDHEC's comments were prepared and submitted to SCDHEC on September 5, 2002. The sampling was performed as proposed.

These data were reviewed with the following results:

- Antimony was detected in one surface soil sample (054SB04501, 10.9 mg/kg) at a concentrations that exceeded its range of background concentrations and its generic SSL of 2.5 mg/kg (DAF=10). Antimony was not detected above its industrial RBC in any surface soil sample.
- Lead was detected in one surface soil sample (054SB05201, 1,230 mg/kg) at a concentration that exceeded is range of background concentrations and its industrial RBC of 1,218 mg/kg.
- Mercury was detected in one surface soil sample (054SB05201, 2.74 mg/kg) at a concentrations that exceeded its range of background concentrations (0.03 to 2.7 mg/kg) and its generic SSL of 1 mg/kg (DAF=10). Mercury was not detected above its industrial RBC in any surface soil sample.
- Antimony and lead were both detected above their range of background concentrations and generic SSLs (DAF=10) in the same subsurface sample (054SB04802). The detected concentrations of antimony and lead was 532 J mg/kg and 12,100 mg/kg, respectively.
- Three SVOCs (benzo[a]anthracene, benzo[a]pyrene, and benzo[b]fluoranthene) were detected at concentrations the exceeded their respective anthropogenic background concentrations, their industrial RBCs and/or their generic SSLs (DAF=10). All three of these compounds are included in the BEQ evaluation. Therefore, BEQ concentrations

were calculated and compared to the anthropogenic background level developed for BEQs. One surface soil sample (054SB04201) had a calculated BEQ concentration that exceeded it anthropogenic background concentration.

Based on these data, it was determined that removal of BEQ-impacted surface soil was appropriate and an IMWP was developed. The IMWP proposed collecting four surface soil delineation samples (054SB05601 through 054SB05901) around soil boring E054SB042 to determine the horizontal extent and one intermediate interval (1 to 2 ft bls) sample (054SB05503) to define the vertical extent of BEQ-impacted soil. The horizontal delineation samples were collected at a distance of ten feet to the north, south, east, and west of soil boring E054SB042. The vertical delineation sample was collected adjacent to soil boring E054SB042. Two RFI subsurface soil sample locations (E054SB031 and E054SB035), which contained elevated BEQ concentrations, were proposed to be re-sampled to confirm the presence of BEQs and resampling subsurface soil at soil boring E054SB048 to confirm the presence of antimony and lead. The presence of antimony and lead in subsurface soil at the reported concentrations was suspicious because the surface samples contained antimony and lead at significantly lower concentrations (2.07 mg/kg and 365 mg/kg, respectively). Therefore this location was proposed to be resampled (054SB05202) to verify these results. The approach for the IM was presented in the *Interim Measure Work Plan, SWMUs 21 and 54, Zone E, Revision 0* (CH2M-Jones, 2002b), and was subsequently approved (Approval Letter, 1/17/2003), by SCDHEC.

Antimony was not detected, and lead was detected at a concentration of 231 mg/kg in sample 045SB05202, indicating that the earlier sample may have contained some foreign material that impacted the results. The calculated BEQ values from subsurface sample 054SB05302 (resample of 054SB03102) and vertical delineation sample 054SB05503 (1 to 2 ft sample at E054SB042) were above the MCS, however only two BEQ constituents (benzo[a]anthracene and benzo[b]fluoranthene) were found to exceed their respective generic SSLs, and preliminary review of the data indicated that mean subsurface concentrations of these two constituents would likely be below the SSL. The horizontal delineation samples to the north and south of soil boring E054SB042 contained BEQ concentrations above the surface soil MCS, indicating that further sampling was necessary to determine the area of BEQ-impacted soil around soil boring E054SB042. Two additional horizontal delineation samples (054SB06001 and 054SB06101) were proposed to complete the BEQ delineation at SWMUs 21 and 54. Collection of these additional delineation samples were proposed in the *Interim Measure Work Plan Addendum, SWMUs 21 and 54, Zone E, Revision 0* (CH2M-Jones, 2003) and approved by SCDHEC on January 21, 2003.

The additional delineation samples were both below the MCS for BEQs. Therefore, further delineation of BEQ-impacted surface soil at the site was not considered necessary and the boundaries of the excavation were established as proposed in the IMWP Addendum.

7.2 Technical Approach of the Interim Measure

The 2003 IM at SWMUs 21 and 54 was intended to address BEQ-impacted surface soil exceeding MCS presented in the IMWP. The extent of soil removal was determined by BEQ concentrations detected in the pre-excavation delineation/confirmation samples. Excavation limits were located to include soil criteria exceedances. Vertical and horizontal limits of contamination were determined by the pre-excavation delineation sampling. The IMWP proposed that the excavation would be backfilled with clean soil following removal of contaminated soil. This approach was presented to the SCDHEC and was approved after review of the IMWP.

7.3 Excavation Activities

The limits of the excavation, based on coordinates from IM WP Addendum sample locations, were staked in the field. Excavation activities were completed in a single day; February 13, 2003. Excavated soil from the site was loaded directly into covered 20 cy dumpsters and on March 4, 2003, the excavated soil was hauled from the site to the disposal landfill. Forty cubic yards (yd^3) of clean backfill material was brought to the site from the designated borrow area.

Air particulates were monitored with dust monitors, and readings were reported at 0.0 milligrams per cubic meter (mg/m^3) (normal).

7.3.1 Excavation Dimensions

The excavation measured approximately 40 ft long by 20 ft wide by 1 ft deep.

7.3.2 Waste Characterization Sampling

A waste characterization sample (054VA001M3) was collected in December 2002 during the first round of delineation sampling and analyzed for toxicity characteristic leaching procedure (TCLP) metals. The TCLP sample was a composite sample comprised of soil from two locations. Lead was detected in the leachate of the waste characterization sample above the acceptable limit for the toxicity characteristic. BEQs were also detected in the delineation samples above the MCS, indicating that further delineation was needed. A second round of delineation samples were collected in January 2003. The results from these delineation

samples indicated that the areal extent of soil containing BEQs above the MCS had been determined. Because the excavation area was expanded, It was determined that a second waste characterization sample would be collected.

The second waste characterization sample (054VA001N2) was collected during the excavation and analyzed for TCLP metals. This TCLP sample was a composite sample comprised of two aliquots from each of the three dumpsters. Because this sample was a composite, comprised of soil from the entire final excavation area, it was used for determining appropriate waste disposal. The analytical results indicated that the excavated soil was suitable for disposal in a Subtitle D landfill. Results for these samples is presented in Table 7-1 and are included in Appendix B.

Approximately 34.4 tons of soil were disposed of at the Oakridge Landfill, 2183 Highway 78, Dorchester, SC 29437 disposal facility as non-hazardous waste. Copies of the waste manifests are included in Appendix G.

Waste storage, handling, characterization and disposal were conducted in accordance with the EPA guidance document, *Management of Remediation Waste Under RCRA* (1998).

7.3.3 Site Restoration

The excavations were backfilled with clean soil soon after the contaminated soil was removed, and graded to restore the site to original elevations.

Appendix H includes copies of site photos taken during various remediation activities at SWMUs 21 and 54.

TABLE 7-1
Waste Characterization (TCLP) Samples
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Charleston Naval Complex

Station ID	Sample ID	Chemical	Date Collected	Concentration (mg/L)	Concentration Qualifier	TCLP Criteria (40CFR261.24)
E054VA001	054VA001M3	Arsenic	12/20/02	0.029	U	5
		Barium	12/20/02	0.393	J	100
		Cadmium	12/20/02	0.016	J	1
		Chromium	12/20/02	0.041	J	5
		Lead	12/20/02	**11.1**	J	5
		Mercury	12/20/02	0.0004	UJ	0.2
		Selenium	12/20/02	0.037	U	1
		Silver	12/20/02	0.012	U	5
E054VA001	054VA001N2	Arsenic	02/13/03	0.041	U	5
		Barium	02/13/03	0.637	J	100
		Cadmium	02/13/03	0.009	J	1
		Chromium	02/13/03	0.017	J	5
		Lead	02/13/03	0.417	J	5
		Mercury	02/13/03	0.001	UJ	0.2
		Selenium	02/13/03	0.042	U	1
		Silver	02/13/03	0.025	U	5

U indicates that the compound was not detected. The reported value is the reporting limit.
UJ indicates that the compound was not detected. The reported value is an estimated reporting limit.
J indicates that the compound was detected and the reported value is an estimated concentration.

Section 8.0

8.0 Recommendations

SWMU 21, the Old Paint Storage Area, consists of a 20-ft by 180-ft concrete pad constructed in 1942 for welding operations. Beginning in 1973, the slab was used for storage of containerized paint wastes from ship repair and overhaul operations.

SWMU 54, the Former Abrasive Blasting Area, consists of the unpaved area around SWMU 21. The site was used for abrasive blasting of ship components and hull sections. Ship components, including anchor chains, were also painted in this area.

The RFI was implemented in 1996 and 1997 by the Navy/EnSafe team. The DET implemented an IM after the RFI to remove soil visibly impacted by blast media. The excavated soil was not backfilled. Based on a review of RFI data, additional data were collected by CH2M-Jones to assess the current surface soil quality. Based on the post-RFI data soil impacted with BEQs was targeted for an IM. Groundwater quality was also assessed. After implementation of the IM, soil and groundwater data were evaluated to assess whether COCs were present. It was concluded that no surface soil COCs are present for the industrial land use scenario. Several subsurface soil and groundwater COCs were identified. The site is suitable for continued and future industrial land use. Because of the site's location in Zone E, it is expected that the site will be used for industrial land use in the future.

LUCs will need to be implemented to restrict the use of this site to non-residential use. This is consistent with the planned future use of the site. A CMS is recommended to address antimony, lead, and BEQs in subsurface soil and antimony, lead, nickel, and thallium in groundwater. A CMSWP for subsurface soil and shallow groundwater is presented in Section 9.0.

Section 9.0

9.0 CMS Work Plan for SWMUs 21 and 54

This CMSWP identifies preliminary remedial action objectives (RAOs) and MCSs for COCs at SWMU 21/54, as well as potential remedial alternatives for preventing unacceptable impacts from COCs in subsurface soil shallow groundwater. A CMS will be performed to evaluate remedial alternatives for subsurface soil and groundwater.

9.1 Remedial Action Objectives

RAOs are medium-specific goals that the remedial actions will be designed to accomplish in order to protect human health and the environment by preventing or reducing exposures under current and future land use conditions. The RAOs identified for the subsurface soil at SWMUs 21 and 54 are being chosen to prevent unacceptable impacts to groundwater from soil containing metals at unacceptable levels. The RAOs identified for shallow groundwater are to prevent ingestion and direct/dermal contact with groundwater having unacceptable noncarcinogenic hazard, and to restore the shallow aquifer to beneficial use conditions.

9.2 Remedial Goal Options and Proposed Media Cleanup Standards

Typically after RAOs have been established and the risk assessment is complete, remedial goal options (RGOs) are developed for each RAO. The RGOs are based on assumptions about a particular land use scenario and include different residual risk levels for comparison. For example, to remediate surface soils to protect an onsite maintenance worker, RGOs might include remediating to anthropogenic background levels or to one of a variety of specific risk levels (such as 1E-06 or 1E-04). For each RGO, a specific MCS is determined for specific chemicals. These MCSs are expressed in conventional concentration units, such as mg/kg or mg/L, for specific chemicals. Remediating the site to those specific MCSs would be suitable to demonstrate that the RAO has been achieved.

The exposure media of concern for SWMUs 21 and 54 are subsurface soil and shallow groundwater.

Potential MCSs for achieving RGOs protective of potentially exposed human receptors (e.g., site workers involved in monitoring and maintenance) under the anticipated future land use

(industrial) will be presented in the CMS. Remedial alternatives for achieving these potential MCSs will be evaluated and described in the CMS.

Antimony, lead, and BEQs are the COCs identified for subsurface soil. Preliminary recommendations for target MCSs for these chemicals are presented below:

Subsurface Soil COC	Preliminary MCS
Antimony	Site-specific SSL
Lead	Site-specific SSL
BEQs	1,400 µg/kg (CNC Sitewide Reference Concentration)

Although site-specific SSLs were calculated for metals during the RFI, these values should be refined based on additional sampling and an improved understanding of the factors affecting leachability of the metals at this site.

The COCs identified for groundwater are antimony, lead, nickel, and thallium. MCSs for these chemicals shall be the EPA Drinking Water Standards (MCLs) or, for those chemicals that do not have an MCL, the EPA Region III RBC (HI=1.0). The table below presents these COCs and their respective MCLs. The MCLs are from EPA Drinking Water Regulations (Summer 2000).

Chemical	EPA Drinking Water MCL (µg/L)	EPA Region III RBC (HI=1.0)
Antimony	6	NA
Lead	15	NA
Nickel	NA	730
Thallium	2	NA

9.3 Corrective Measures Evaluation

The CMS will evaluate options for addressing potential impact to groundwater from subsurface soil COCs and for preventing unacceptable exposure to or ingestion of groundwater. Potential approaches to achieving the MCS in soil include refinement of the site-specific SSL, monitoring, soil excavation, and stabilization. Approaches to achieving the

MCSs for groundwater include land use controls (LUCs), natural attenuation, long term monitoring, and in situ treatment.

9.4 CMS Approach

The CMS will consist of the following tasks:

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

9.5 Approach to Evaluating Corrective Measure Alternatives

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

1. Protect human health and the environment.
2. Attain MCSs (RGOs).
3. Control the source of releases to minimize future releases that may pose a threat to human health and the environment.
4. Comply 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 criteria is defined in more detail below:

1. **Protect 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 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. **Attain MCSs (RGOs).** The alternatives will be evaluated on the basis of their ability to achieve the RGOs defined in this CMS Work Plan. Another aspect of this is the time frame to achieve the RGOs. Estimates of the time frame for the alternatives to achieve RGOs will be provided.

3. **Control the source of releases.** This deals with the control of releases of contamination from the source (the area or material from which the contamination originated).

4. **Comply with applicable standards for the management of wastes.** This deals with the management of wastes derived from implementing the alternatives, e.g., treatment or disposal of excavated material. The removal alternative will be designed to comply with all standards for management of wastes.

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

a. **Long-term reliability and effectiveness**

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

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

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

c. **Short-term effectiveness**

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

d. **Implementability**

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

e. **Cost**

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

9.6 CMS Report

The CMS Report will present the identification, development, and evaluation of potential corrective measures for SWMUs 21 and 54. A proposed outline of the report, as shown in Table 9-1, provides an example of the report format and content organization.

TABLE 9-1
Outline of CMS Report for SWMUs 21 and 54
RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, 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 Options**
3.0	**Detailed Analysis of Focused Alternatives**
3.1	Approach
3.2	Evaluation Criteria
3.3	Description of Soil Alternatives [a]
3.3.1	Alternative 1: Land Use Controls
3.3.2	Alternative 2: Soil Removal and Disposal
3.4	Description of Groundwater Alternatives [a]
3.4.1	Alternative 1: Land Use Controls
3.4.2	Alternative 2: Monitored Natural Attenuation
3.5	Comparative Analysis of Alternatives
3.5.1	Soil Alternatives
3.5.2	Groundwater Alternatives
4.0	**Recommended Remedial Alternatives**
5.0	**References**
Appendix A	**Corrective Measure Alternative Cost Estimates** [b]
List of Tables	
List of Figures	

[a] Additional alternatives will be analyzed, if necessary.

[b] Additional appendices will be added, if necessary.

Section 10.0

10.0 References

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Appendix A

COMPLETION REPORT

INTERIM/STABILIZATION MEASURE FOR
SWMU 21 & SWMU 54
NAVAL BASE CHARLESTON
CHARLESTON SC

Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON SC

Prepared by:

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11 February, 1997

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ACRONYMS, ABBREVIATIONS and SYMBOLS

AOC	Area of Concern
CIA	Controlled Industrial Area
CMS	Corrective Measures Study
DERP	Defense Environmental Restoration Program
DET	Environmental Detachment Charleston
DON	Department of the Navy
DRMO	Defense Reutilization and Marketing Office
EOX	Extractable Organic Halides
IM	Interim Measure
IR	Installation Restoration
mg/kg	milligrams per kilogram (equal to parts per million)
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
ROC	Run of Crusher (crushed aggregate)
SARA	Superfund Amendments and Reauthorization Act
SCDHEC	South Carolina Department of Health and Environmental Control
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SUPSHIP	Supervisor of Shipbuilding, Conversion and Repair, USN
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TSDF	Treatment, Storage and Disposal Facility
USN	United States Navy
μg/kg	micrograms per kilogram (equal to parts per billion)

1. INTRODUCTION

1.1 INSTALLATION RESTORATION PROGRAM. The purpose of the Department of the Navy (DON) Installation Restoration (IR) Program is to identify, assess, characterize and clean up or control contamination from past hazardous waste disposal operations and hazardous material spills at Navy and Marine Corps activities. The Defense Environmental Restoration Program (DERP) is codified in the Superfund Amendments and Reauthorization Act (SARA) Section 211 (10 USC 2701). The IR Program is a component of DERP.

1.1.1 Naval Base Charleston IR Program. At Naval Base Charleston, a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) was prepared which divided the Naval Base into zones and identified Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) within each zone. The RFA evaluated each SWMU and AOC and determined which sites required further investigation. Based on the RFA, a RCRA Facility Investigation (RFI) work plan has been or is being prepared for each zone containing SWMUs and AOCs requiring further investigation. On completion of the RFI for each Zone, a RFI report will be prepared for that zone. The RFI reports will identify SWMUs and AOCs containing wastes requiring remediation. Eventually, Corrective Measures Studies (CMSs) will be prepared to determine the best means of remediating each site.

1.2 INTERIM MEASURES. Interim Measures (IM) performed as part of the IR Program are intended to eliminate sources of environmental contamination or limit the spread of environmental contaminants prior to the completion of the RFI CMSs.

1.3 SOLID WASTE MANAGEMENT UNITS 21 & 54. SWMU 54 is the site of a former abrasive blasting area, which is located in Zone "E" of the RFI at the north end of the Controlled Industrial Area (CIA) adjacent to the Cooper River. The area surrounds SWMU 21 (Slab 1275), an uncovered concrete pad which was used for temporary storage of containerized paint wastes awaiting offsite transport. Figure A-1 of Appendix A illustrates these two sites. Abrasive blast media, which

2. INTERIM MEASURE EXECUTION

2.1 ACTIONS REQUIRED BY INTERIM MEASURE WORKPLAN. Removal was performed to the maximum extent practical and an estimated 1000 cubic yards of material containing the remaining spent abrasive blast residue was properly disposed. Required actions included excavation from the following areas:

- Removal of all obvious spent abrasive blast residue from all exposed surfaces of soil, asphalt or concrete including the area underneath the slab for as far as can be reached;

- Removal of all obvious spent abrasive blast residue from the marsh mud area on the Cooper River side of the boundary fence. This required removal of the entire fence along the eastern boundary of the site and subsequent reconstruction of the fence;

- Removal of subsurface abrasive blast residue from all remaining soil areas of the site. Refer to Figure A-1 and corresponding Table A-1 of Appendix A for location, depth to residue and residue thickness data recorded for all areas of the site. This data, collected by Ensafe/Allen & Hoshall, was used to estimate the extent of excavation necessary for the majority of the total area of the site;

- Excavated areas were contoured at the site to blend into the surrounding area while maintaining, as near as possible, the original general shape and slope. Backfilling of excavated areas was not performed.

2.2 OBSERVATIONS NOTED

2.2.1 Compressed Air Piping Uncovered During Excavation

2.2.1.1 Observation. The depth of excavation along the south side of the concrete pad (slab 1275)

3. INTERIM MEASURE OUTCOME

3.1 SITE CONDITIONS FOLLOWING COMPLETION OF WORK. Following completion of all site work on 3 September 1996, the site was clean of no visible spent abrasive blast residue remaining. Since a significant amount of the total excavated volume of material was taken from areas immediately adjacent to the long sides of slab 1275 where much of the loose spent abrasive blast residue had collected, more of the pilings which support slab 1275 were left exposed. Also, the overall general shape and slope of the site remained the same as it was prior to the start of the IM. Photos D-3 and D-4 of Appendix D reflect soil excavation immediately adjacent to slab 1275 as well as the absence of the dark shaded areas previously identified as areas with remaining spent abrasive blast residue. As a result of IM work at this site, four on site monitoring wells were abandoned. Monitoring wells NBCE-054-001, NBCE-054-003 and NBCE-021-002 were abandoned on 28 October, 1996 and monitoring well NBCE-021-001 was abandoned on 5 November, 1996.

4. SAMPLING

4.1 SAMPLING EVOLUTIONS AND RESULTS

4.1.1 Field Sampling. Field samples were taken during excavation from all areas of the site to verify removal of the spent abrasive blast residue. These samples were taken manually from the excavated surface, as required, for a simple visual analysis to determine the presence or absence of abrasive residue. Field samples were not submitted for laboratory analysis. Field sampling results were not recorded.

4.1.2 Confirmatory Sampling. Following removal of all spent abrasive blast residue, as determined by field sampling, confirmatory visual samples were taken. These samples were taken in the same manner as field samples and were visually analyzed for the presence or absence of spent abrasive. Confirmatory sample locations were grid-based using 25 foot centers with one sample taken from each grid block. Figure B-1 of Appendix B illustrates this sampling grid. There was no spent abrasive blast residue present in any of the confirmatory samples.

4.1.3 Waste Characterization Sampling. Samples were collected and analyzed for characterization and proper disposal of all excavated material. One composite sample was collected for each 40 cubic yard stockpile of excavated material and submitted for laboratory analysis. A copy of the analytical results of all waste characterization samples is included in Appendix B. Table B-1 of Appendix B summarizes these results. Figure B-2 of Appendix B illustrates the arrangement of all stockpiled soil excavated from the site with corresponding sampling information.

5. WASTE GENERATION

5.1 HAZARDOUS/POTENTIALLY HAZARDOUS WASTE. The hazardous waste identified below in paragraph 5.1.1 was turned in to the DET Hazardous Waste Facility at Building 1824 for disposal on 3 September 1996. The DET Hazardous Waste Facility is a less than 90 day storage facility as defined in South Carolina Department of Health and Environmental Control (SCDHEC) regulations R.61-79.265.

5.1.1 Hazardous Excavated Soil. Four shipments for a total of 37,254 pounds of lead contaminated soil was packed in drums and transported to the DET Hazardous Waste Facility on 3 September 1996. All of this soil was profiled as hazardous per Profile Number N00191-6A04. Tracer numbers 6247HH01, 6247HH02, 6247HH03 and 6247HH04 were assigned for each shipment respectively. This soil was turned over to the Defense Reutilization and Marketing Office (DRMO) and listed for disposal on Purchase Order No. SP440096D0020, Delivery Order No. 0008 dated 20 September 1996. This soil was transported offsite to Chem-Met Services, Wyandotte, Michigan, a permitted Treatment, Storage and Disposal Facility (TSDF) on 21 October 1996 on State Manifest Document No. 4056977 (see Appendix C, Item 1).

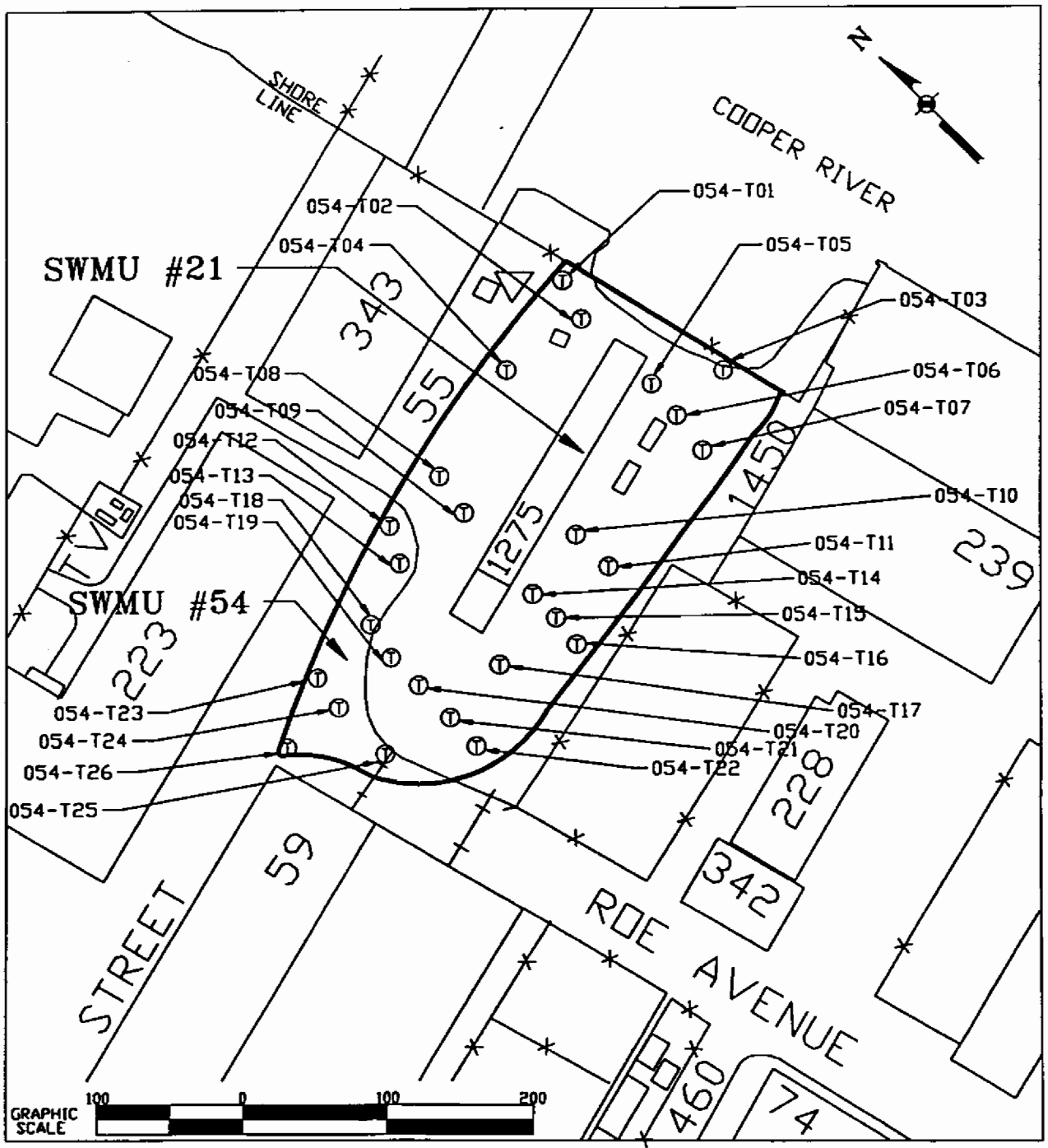
5.2 NON-HAZARDOUS WASTE

5.2.1 Non-Hazardous Excavated Soil. Between 22 August 1996 and 27 August 1996, a total of 1,443.76 tons of non-hazardous excavated soil containing spent abrasive blast residue was transported from SWMU 54 site to Oakridge (Chambers) Landfill located in Dorchester County, South Carolina under contract number N62467-96-M-4438. Copies of the Purchase Order, DD Form 1155, and a facsimile modifying the contract quantities are included in Appendix C as Item 2 and Item 3 respectively.

APPENDIX A

SITE MAPS

FIGURE A-1
SWMUs 21 AND 54 SITE MAP



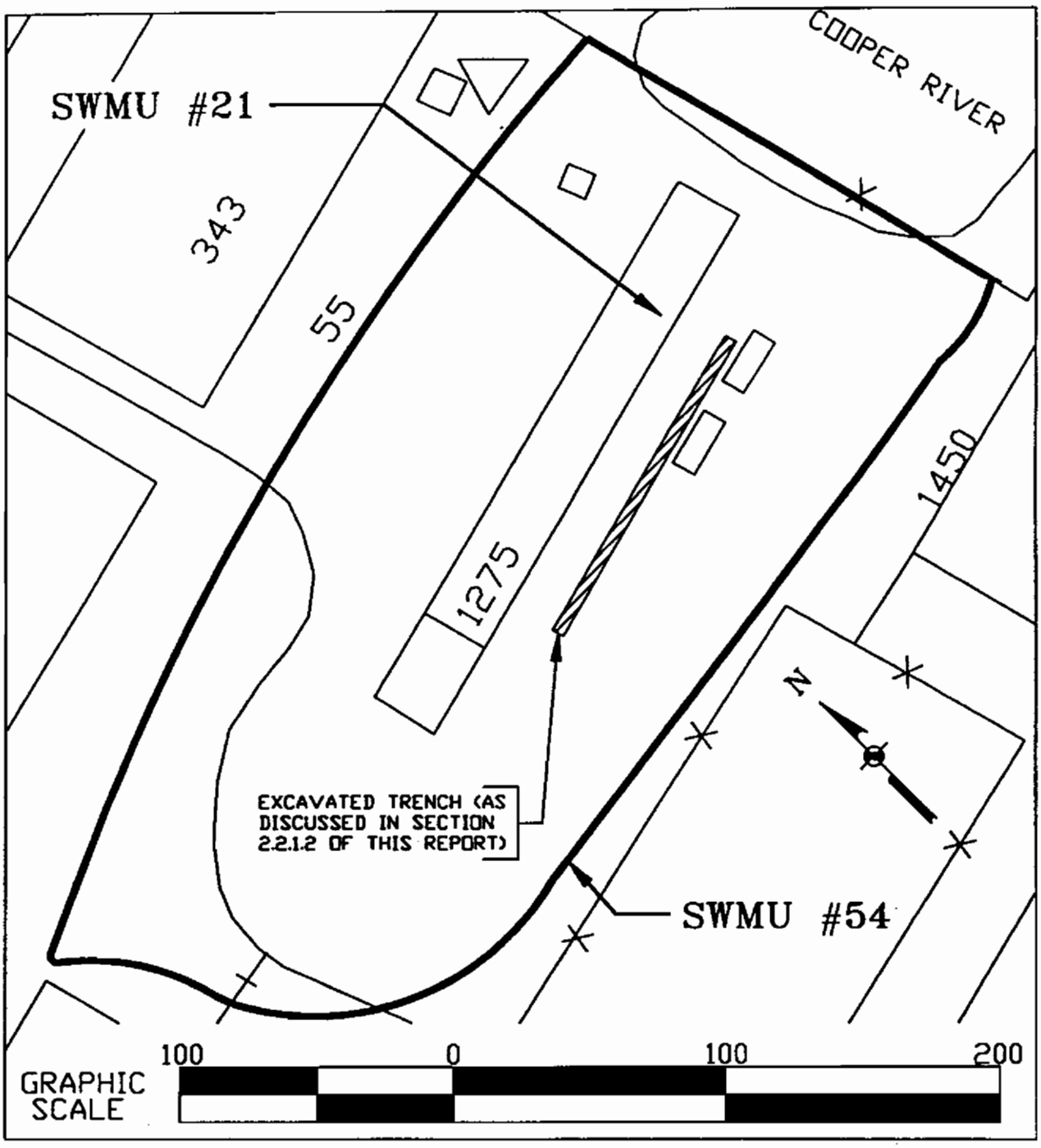
Ⓣ SAMPLE LOCATION FOR ABRASIVE BLAST RESIDUE DEPTH & THICKNESS

SWMU #54 ABRASIVE BLAST RESIDUE DEPTH & THICKNESS DATA (INCHES)		
SAMPLE #	DEPTH TO RESIDUE	RESIDUE THICKNESS
054-T01	N/A	N/A
054-T02	2	10
054-T03	0 (at surface)	8
054-T04	4	6
054-T05	1	11
054-T06	5	6
054-T07	0	10
054-T08	0	1 (to ROC)
054-T09	0	9
054-T10	0	1 (to ROC)
054-T11	0	8 (to ROC)
054-T12	0	1 (to ROC)
054-T13	0	10
054-T14	0	1 (to ROC)
054-T15	0	1 (to ROC)
054-T16	0	1 (to ROC)
054-T17	0	1 (to ROC)
054-T18	asphalt surface	0 (asphalt surface)
054-T19	0	1 (to asphalt)
054-T20	0	1 (to asphalt)
054-T21	0	1 (to asphalt)
054-T22	0	1 (to asphalt)
054-T23	asphalt surface	0 (asphalt surface)
054-T24	asphalt surface	0 (asphalt surface)
054-T25	asphalt surface	0 (asphalt surface)

ROC = Run of Crusher

TABLE A-1

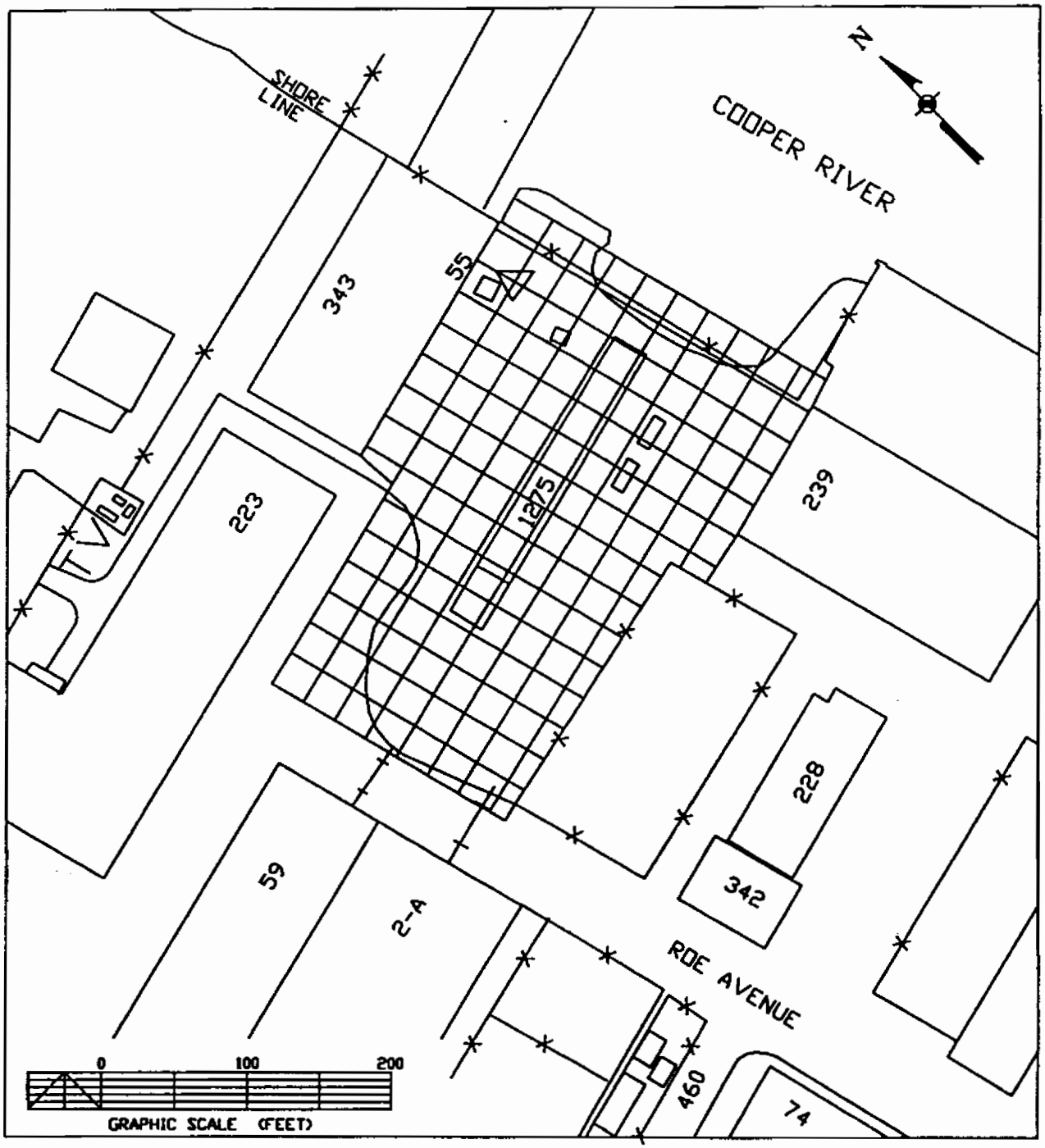
FIGURE A-2
SWMU 54 EXCAVATED TRENCH



APPENDIX B

SAMPLING DOCUMENTATION

FIGURE B-1
SWMU 54 CONFIRMATORY SAMPLING GRID MAP



SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
1	MAY 7	1 AND 3	SPORT-0024-1 SPORT-0042-1 NBCE054S000100 TCLP (8 RCRA), ** TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH	AUGUST 22 - 27	** TOTAL METALS, EOX AND TPH TESTS REQUESTED ON MAY 17 ON SPORT-0042. RESULTS WERE RECORDED UNDER SPORT-0042 BECAUSE SPORT-0024 WAS ALREADY CLOSED.
2	MAY 7	2	SPORT-0024-2 SPORT-0042-2 NBCE054S000200 TCLP (8 RCRA), ** TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH	AUGUST 22 - 27	** TOTAL METALS, EOX AND TPH TESTS REQUESTED ON MAY 17 ON SPORT-0042. RESULTS WERE RECORDED UNDER SPORT-0042 BECAUSE SPORT-0024 WAS ALREADY CLOSED.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
3	MAY 7	4 AND 5	SPORT-0024-3 SPORT-0042-3 NBCE054S000300 TCLP (8 RCRA), ** TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH	AUGUST 22 - 27	** TOTAL METALS, EOX AND TPH TESTS REQUESTED ON MAY 17 ON SPORT-0042. RESULTS WERE RECORDED UNDER SPORT-0042 BECAUSE SPORT-0024 WAS ALREADY CLOSED.
4	MAY 10	6 AND 7	SPORT-0031-1 SPORT-0031-1R NBCE054S000400 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0053. NOTE: SPORT-0031, WHICH WAS STILL OPEN, WAS RELOGGED BY GENERAL ENGINEERING LABORATORIES AND RESULTS WERE RECORDED ON SPORT-0031-1R 9605184-01.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
5	MAY 10	8, 9 AND 10	SPORT-0031-2 SPORT-0031-2R NBCE054S000500 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0053. NOTE: SPORT-0031, WHICH WAS STILL OPEN, WAS RELOGGED BY GENERAL ENGINEERING LABORATORIES AND RESULTS WERE RECORDED ON SPORT-0031-2R 9605184-02.
6	MAY 10	11 AND 12	SPORT-0031-3 SPORT-0031-3R NBCE054S000600 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0053. NOTE: SPORT-0031, WHICH WAS STILL OPEN, WAS RELOGGED BY GENERAL ENGINEERING LABORATORIES AND RESULTS WERE RECORDED ON SPORT-0031-3R 9605184-03.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
7	MAY 16	13 AND 14	SPORT-0040-1 NBCE054S000700 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0040 WHICH WAS STILL OPEN.
8	MAY 16	15	SPORT-0040-2 NBCE054S000800 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0040 WHICH WAS STILL OPEN.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
9	MAY 16	16 AND 17	SPORT-0040-3 NBCE054S000900 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0040 WHICH WAS STILL OPEN.
10	MAY 21	18 AND 20	SPORT-0049-1 NBCE054S001000 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0049 WHICH WAS STILL OPEN.

Table B-1 (18 Sheets)

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
11 +++ SEE REMARKS	MAY 21	19 AND 21	SPORT-0049-2 SPORT-0049-2R NBCE054S001100 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA) +++ TCLP (VOLATILES), TCLP (ACID COMPOUNDS) AND TCLP (BASE/NEUTRAL COMPOUNDS)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0049 WHICH WAS STILL OPEN. +++ HIGH EOX RESULTS. SCDHEC LTR DTD 6-26-96 REQUESTED ADDITIONAL TEST ON EXISTING SAMPLE MATERIAL AND RE-SAMPLING OF STOCKPILES. ADDITIONAL TESTS ON EXISTING SAMPLE MATERIAL REQUESTED ON JULY 9 ON SPORT-0096, BUT RESULTS WERE RECORDED UNDER 9605363-02-R-SPORT-0049-2. SEE SAMPLE NOS. 25, 26 AND 27 FOR RE-SAMPLING INFORMATION ON STOCKPILES.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
12	MAY 21	22 AND 23	SPORT-0049-3 NBCE054S001200 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0049 WHICH WAS STILL OPEN.
13	MAY 21	24 AND 25	SPORT-0049-4 NBCE054S001300 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX AND TPH ** TCLP (8 RCRA)	AUGUST 22 - 27	** TCLP TEST REQUESTED ON MAY 23 ON SPORT-0049 WHICH WAS STILL OPEN.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
14	MAY 24	26 AND 27	SPORT-0058-1 NBCE054S001400 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX, TPH AND TCLP (8 RCRA)	AUGUST 22 - 27	
15	MAY 24	28 AND 30	SPORT-0058-2 NBCE054S001500 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX, TPH AND TCLP (8 RCRA)	AUGUST 22 - 27	

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
16	MAY 24	29 AND 31	SPORT-0058-3 NBCE054S001600 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX, TPH AND TCLP (8 RCRA)	AUGUST 22 - 27	
17	JUNE 5	32 AND 34	SPORT-0069-1 NBCE054S001700 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX, TPH AND TCLP (8 RCRA)	AUGUST 22 - 27	

Table B-1 (18 Sheets)

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
18	JUNE 5	33 AND 35	SPORT-0069-2 NBCE054S001800 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX, TPH AND TCLP (8 RCRA)	AUGUST 22 - 27	
19 +++ SEE REMARKS	JUNE 5	38 AND 39 +++ SEE REMARKS	SPORT-0069-3 NBCE054S001900 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX, TPH AND TCLP (8 RCRA)	+++ SEE REMARKS	+++ STOCKPILE NOS. 38 AND 39 WERE SPLIT INTO STOCKPILE NOS. 38A, 39A, 38B AND 39B AND WERE RE-SAMPLED BECAUSE OF HIGH CONCENTRATIONS OF LEAD. SEE SAMPLE NOS. 21, 22, 23 AND 24 FOR RE-SAMPLING INFORMATION.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
20	JUNE 5	36, 37 AND 40	SPORT-0069-4 NBCE054S002000 TOTAL METALS (INCLUDING ANTIMONY, BERYLLIUM AND NICKEL), EOX, TPH AND TCLP (8 RCRA)	AUGUST 22 - 27	
21 +++ SEE REMARKS	JULY 18	38A +++ SEE REMARKS *** SEE REMARKS	SPORT-0104-1 NBCE054S002100 TCLP (8 RCRA)	*** SEE REMARKS	+++ STOCKPILE NO. 38 WAS SPLIT INTO STOCKPILE NOS. 38A & 38B AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 19 TCLP-METALS TEST. *** STOCKPILE NO. 38A WAS SEPERATED INTO STOCKPILE NOS. 38A-1, 38A-2, 38A-3 AND 38A-4 AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON THIS SAMPLE (NO. 21). SEE SAMPLE NOS. 28, 29, 30 & 31 FOR RE-SAMPLING INFORMATION.

Table B-1 (18 Sheets)

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
22 +++ SEE REMARKS	JULY 18	39A +++ SEE REMARKS	SPORT-0104-2 NBCE054S002200 TCLP (8 RCRA)	AUGUST 22 - 27	+++ STOCKPILE NO. 39 WAS SPLIT INTO STOCKPILE NOS. 39A & 39B AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 19 TCLP-METALS TEST.
23 +++ SEE REMARKS	JULY 18	38B +++ SEE REMARKS	SPORT-0104-3 NBCE054S002300 TCLP (8 RCRA)	AUGUST 22 - 27	+++ STOCKPILE NO. 38 WAS SPLIT INTO STOCKPILE NOS. 38A & 38B AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 19 TCLP-METALS TEST.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
24 +++ SEE REMARKS	JULY 18	39B +++ SEE REMARKS	SPORT-0104-4 NBCE054S002400 TCLP (8 RCRA)	AUGUST 22 - 27	+++ STOCKPILE NO. 39 WAS SPLIT INTO STOCKPILE NOS. 39A & 39B AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 19 TCLP-METALS TEST.
25 +++ SEE REMARKS	JULY 19	19 AND 21	SPORT-0106-1 NBCE054S002500 EOX	AUGUST 22 - 27	+++ THIS WAS A RE-SAMPLE OF STOCKPILE NOS. 19 AND 21 BECAUSE OF HIGH EOX RESULTS ON SAMPLE NO. 11. RE-SAMPLE REQUESTED BY SCDHEC LETTER DTD 6-26-96.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
26 +++ SEE REMARKS	JULY 19	19	SPORT-0106-2 NBCE054S002600 TCLP - VOLATILES	AUGUST 22 - 27	+++ THIS ADDITIONAL SAMPLING WAS REQUESTED BY SCDHEC LETTER DTD 6-26-96 BECAUSE OF HIGH EOX RESULTS ON SAMPLE NO. 11.
27 +++ SEE REMARKS	JULY 19	21	SPORT-0106-3 NBCE054S002700 TCLP - VOLATILES	AUGUST 22 - 27	+++ THIS ADDITIONAL SAMPLING WAS REQUESTED BY SCDHEC LETTER DTD 6-26-96 BECAUSE OF HIGH EOX RESULTS ON SAMPLE NO. 11.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER / TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
28 +++ SEE REMARKS *** SEE REMARKS	AUG 13	38A-1 +++ SEE REMARKS *** SEE REMARKS	SPORT-0136-1 NBCE054S002800 TCLP (8 RCRA)	AUGUST 30 *** SEE REMARKS	+++ STOCKPILE NO. 38A WAS SEPERATED INTO STOCKPILE NOS. 38A-1, 38A-2, 38A-3 AND 38A-4 AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 21 TCLP-METALS TEST. *** RESULTS FROM THIS SAMPLE (NO. 28) INDICATED HIGH CONCENTRATIONS OF LEAD IN STOCKPILE NO. 38A-1. SOIL WAS PLACED IN 55 GALLON DRUMS AND REMOVED AS HAZARDOUS MATERIAL.

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
29 +++ SEE REMARKS *** SEE REMARKS	AUG 13	38A-2 +++ SEE REMARKS *** SEE REMARKS	SPORT-0136-2 NBCE054S002900 TCLP (8 RCRA)	AUGUST 28 *** SEE REMARKS	+++ STOCKPILE NO. 38A WAS SEPERATED INTO STOCKPILE NOS. 38A-1, 38A-2, 38A-3 AND 38A-4 AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 21 TCLP-METALS TEST. *** RESULTS FROM THIS SAMPLE (NO. 29) INDICATED HIGH CONCENTRATIONS OF LEAD IN STOCKPILE NO. 38A-2. SOIL WAS PLACED IN 55 GALLON DRUMS AND REMOVED AS HAZARDOUS MATERIAL.

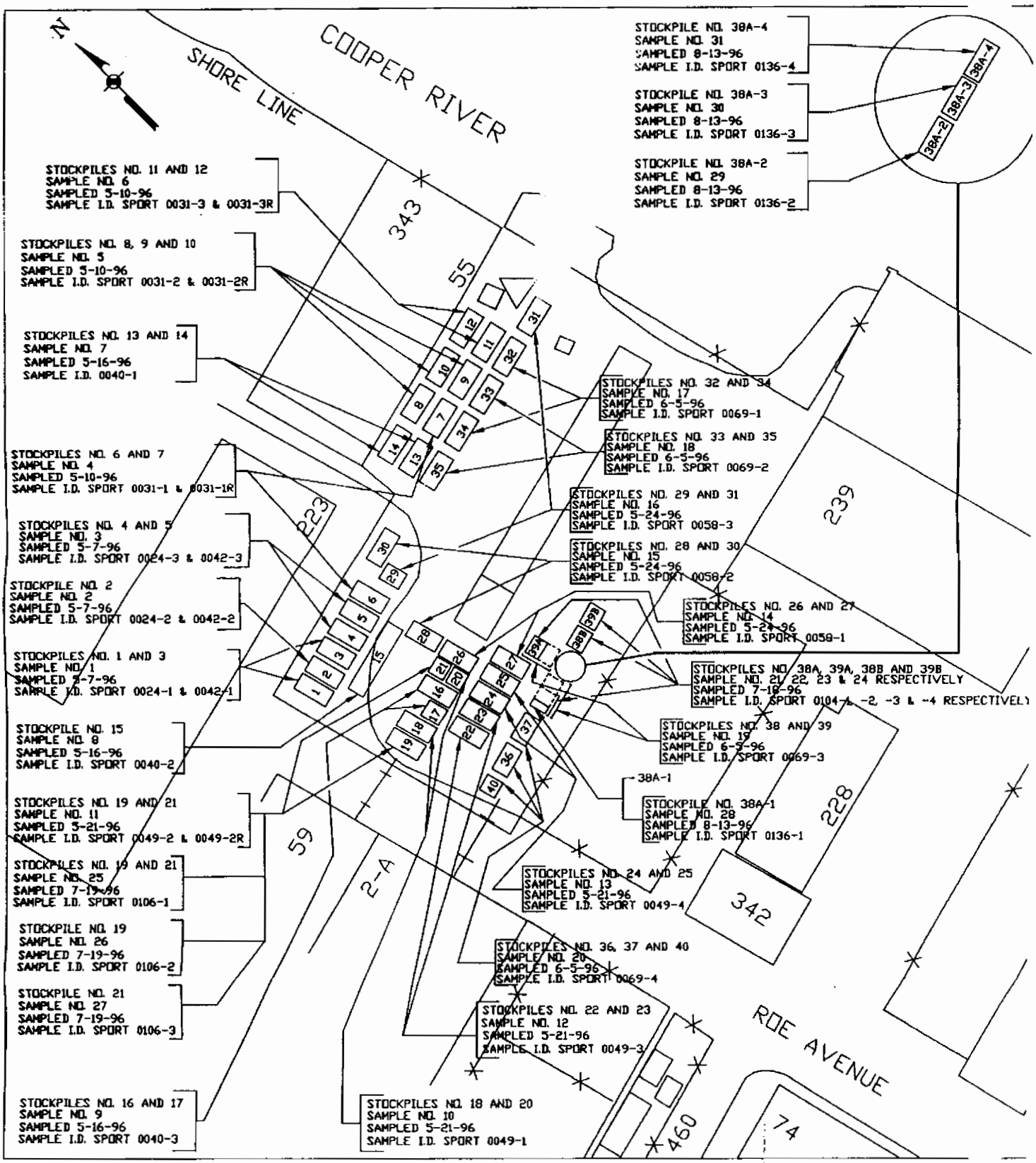
SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
30 +++ SEE REMARKS *** SEE REMARKS	AUG 13	38A-3 +++ SEE REMARKS *** SEE REMARKS	SPORT-0136-3 NBCE054S003000 TCLP (8 RCRA)	AUGUST 28 *** SEE REMARKS	+++ STOCKPILE NO. 38A WAS SEPERATED INTO STOCKPILE NOS. 38A-1, 38A-2, 38A-3 AND 38A-4 AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 21 TCLP-METALS TEST. *** RESULTS FROM THIS SAMPLE (NO. 30) INDICATED HIGH CONCENTRATIONS OF LEAD IN STOCKPILE NO. 38A-3. SOIL WAS PLACED IN 55 GALLON DRUMS AND REMOVED AS HAZARDOUS MATERIAL.

Table B-1 (18 Sheets)

SWMU 54 WASTE CHARACTERIZATION SAMPLING RESULTS SUMMARY					
SAMPLE NUMBER	SAMPLE DATE (1996)	STOCKPILE NUMBER SAMPLED	SAMPLE ID NUMBER TEST(S) REQUESTED	DATE SOIL REMOVED FROM SITE (1996)	REMARKS
31 +++ SEE REMARKS *** SEE REMARKS	AUG 13	38A-4 +++ SEE REMARKS *** SEE REMARKS	SPORT-0136-4 NBCE054S003100 TCLP (8 RCRA)	AUGUST 29 *** SEE REMARKS	+++ STOCKPILE NO. 38A WAS SEPERATED INTO STOCKPILE NOS. 38A-1, 38A-2, 38A-3 AND 38A-4 AND RE-SAMPLED BECAUSE OF HIGH LEAD RESULTS ON SAMPLE NO. 21 TCLP-METALS TEST. *** RESULTS FROM THIS SAMPLE (NO. 31) INDICATED HIGH CONCENTRATIONS OF LEAD IN STOCKPILE NO. 38A-4. SOIL WAS PLACED IN 55 GALLON DRUMS AND REMOVED AS HAZARDOUS MATERIAL.

FIGURE B-2

SWMU 54 EXCAVATED SOIL STOCKPILE MAP



Appendix B

	StationID	E054SB041		E054SB042		E054SB043	
	SampleID	054SB04101 (0-1ft)		054SB04201 (0-1ft)		054CB04301 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/20/2002		09/20/2002		09/20/2002	
	DateAnalyzed	09/20/2002		09/20/2002		09/20/2002	
	SDGNumber	67237		67237		67237	
Parameter	**Units**						
Chloromethane	ug/kg	10.7	U	10.1	U	10.4	U
Vinyl chloride	ug/kg	10.7	U	10.1	U	10.4	U
Bromomethane	ug/kg	10.7	U	10.1	U	10.4	U
Chloroethane	ug/kg	10.7	U	10.1	U	10.4	U
1,1-Dichloroethene	ug/kg	5.3	U	5	U	5.2	U
Acetone	ug/kg	10.7	U	10.1	U	5	J
Carbon Disulfide	ug/kg	5.3	U	5	U	5.2	U
Methylene Chloride	ug/kg	5.3	U	5	U	5.2	U
trans-1,2-Dichloroethene	ug/kg	5.3	U	5	U	5.2	U
1,1-Dichloroethane	ug/kg	5.3	U	5	U	5.2	U
Vinyl acetate	ug/kg	10.7	U	10.1	U	10.4	U
Methyl ethyl ketone (2-Butanone)	ug/kg	10.7	UJ	10.1	UJ	10.4	UJ
cis-1,2-Dichloroethylene	ug/kg	5.3	U	5	U	5.2	U
1,2-Dichloroethene (total)	ug/kg	5.3	U	5	U	5.2	U
Chloroform	ug/kg	5.3	U	5	U	5.2	U
1,1,1-Trichloroethane	ug/kg	5.3	U	5	U	5.2	U
Carbon Tetrachloride	ug/kg	5.3	U	5	U	5.2	U
1,2-Dichloroethane	ug/kg	5.3	U	5	U	5.2	U
Benzene	ug/kg	5.3	U	5	U	5.2	U
Trichloroethylene (TCE)	ug/kg	5.3	U	5	U	5.2	U
1,2-Dichloropropane	ug/kg	5.3	U	5	U	5.2	U
Bromodichloromethane	ug/kg	5.3	U	5	U	5.2	U
2-Chloroethyl vinyl ether	ug/kg	10.7	UJ	10.1	UJ	10.4	UJ
cis-1,3-Dichloropropene	ug/kg	5.3	U	5	U	5.2	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	10.7	U	10.1	U	10.4	U
Toluene	ug/kg	5.3	U	5	U	5.2	U
trans-1,3-Dichloropropene	ug/kg	5.3	U	5	U	5.2	U
1,1,2-Trichloroethane	ug/kg	5.3	U	5	U	5.2	U
2-Hexanone	ug/kg	10.7	UJ	10.1	UJ	10.4	UJ
Tetrachloroethylene (PCE)	ug/kg	5.3	U	5	U	5.2	U

	StationID	E054SB043		E054SB044		E054SB045	
	SampleID	054SB04301 (0-1ft)		054SB04401 (0-1ft)		054SB04501 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/20/2002		09/20/2002		09/20/2002	
	DateAnalyzed	09/20/2002		09/20/2002		09/20/2002	
	SDGNumber	67237		67237		67237	
Parameter	**Units**						
Chloromethane	ug/kg	9.7	U	9.6	U	10.5	U
Vinyl chloride	ug/kg	9.7	U	9.6	U	10.5	U
Bromomethane	ug/kg	9.7	U	9.6	U	10.5	U
Chloroethane	ug/kg	9.7	U	9.6	U	10.5	U
1,1-Dichloroethene	ug/kg	4.8	U	4.8	U	5.3	U
Acetone	ug/kg	10.3	=	10.8	=	5.7	J
Carbon Disulfide	ug/kg	4.8	U	4.8	U	5.3	U
Methylene Chloride	ug/kg	4.8	U	4.8	U	5.3	U
trans-1,2-Dichloroethene	ug/kg	4.8	U	4.8	U	5.3	U
1,1-Dichloroethane	ug/kg	4.8	U	4.8	U	5.3	U
Vinyl acetate	ug/kg	9.7	U	9.6	U	10.5	U
Methyl ethyl ketone (2-Butanone)	ug/kg	9.7	UJ	9.6	UJ	10.5	UJ
cis-1,2-Dichloroethylene	ug/kg	4.8	U	4.8	U	5.3	U
1,2-Dichloroethene (total)	ug/kg	4.8	U	4.8	U	5.3	U
Chloroform	ug/kg	4.8	U	4.8	U	5.3	U
1,1,1-Trichloroethane	ug/kg	4.8	U	4.8	U	5.3	U
Carbon Tetrachloride	ug/kg	4.8	U	4.8	U	5.3	U
1,2-Dichloroethane	ug/kg	4.8	U	4.8	U	5.3	U
Benzene	ug/kg	4.8	U	4.8	U	5.3	U
Trichloroethylene (TCE)	ug/kg	4.8	U	4.8	U	5.3	U
1,2-Dichloropropane	ug/kg	4.8	U	4.8	U	5.3	U
Bromodichloromethane	ug/kg	4.8	U	4.8	U	5.3	U
2-Chloroethyl vinyl ether	ug/kg	9.7	UJ	9.6	UJ	10.5	UJ
cis-1,3-Dichloropropene	ug/kg	4.8	U	4.8	U	5.3	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	9.7	U	9.6	U	10.5	U
Toluene	ug/kg	4.8	U	4.8	U	5.3	=
trans-1,3-Dichloropropene	ug/kg	4.8	U	4.8	U	5.3	U
1,1,2-Trichloroethane	ug/kg	4.8	U	4.8	U	5.3	U
2-Hexanone	ug/kg	9.7	UJ	9.6	UJ	10.5	UJ
Tetrachloroethylene (PCE)	ug/kg	4.8	U	4.8	U	5.3	U

	StationID	E054SB046		E054SB047		E054SB052	
	SampleID	054SB04601 (0-1ft)		054SB04701 (0-1ft)		054SB05201 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/20/2002		09/20/2002		09/20/2002	
	DateAnalyzed	09/20/2002		09/20/2002		09/20/2002	
	SDGNumber	67237		67237		67237	
Parameter	**Units**						
Chloromethane	ug/kg	9.8	U	10	U	10.6	U
Vinyl chloride	ug/kg	9.8	U	10	U	10.6	U
Bromomethane	ug/kg	9.8	U	10	U	10.6	U
Chloroethane	ug/kg	9.8	U	10	U	10.6	U
1,1-Dichloroethene	ug/kg	4.9	U	5	U	5.3	U
Acetone	ug/kg	9.8	U	10	U	10.6	U
Carbon Disulfide	ug/kg	4.9	U	5	U	5.3	U
Methylene Chloride	ug/kg	4.9	U	5	U	5.3	U
trans-1,2-Dichloroethene	ug/kg	4.9	U	5	U	5.3	U
1,1-Dichloroethane	ug/kg	4.9	U	5	U	5.3	U
Vinyl acetate	ug/kg	9.8	U	10	U	10.6	U
Methyl ethyl ketone (2-Butanone)	ug/kg	9.8	UJ	10	UJ	10.6	UJ
cis-1,2-Dichloroethylene	ug/kg	4.9	U	5	U	5.3	U
1,2-Dichloroethene (total)	ug/kg	4.9	U	5	U	5.3	U
Chloroform	ug/kg	4.9	U	5	U	5.3	U
1,1,1-Trichloroethane	ug/kg	4.9	U	5	U	5.3	U
Carbon Tetrachloride	ug/kg	4.9	U	5	U	5.3	U
1,2-Dichloroethane	ug/kg	4.9	U	5	U	5.3	U
Benzene	ug/kg	4.9	U	5	U	5.3	U
Trichloroethylene (TCE)	ug/kg	4.9	U	5	U	5.3	U
1,2-Dichloropropane	ug/kg	4.9	U	5	U	5.3	U
Bromodichloromethane	ug/kg	4.9	U	5	U	5.3	U
2-Chloroethyl vinyl ether	ug/kg	9.8	UJ	10	UJ	10.6	UJ
cis-1,3-Dichloropropene	ug/kg	4.9	U	5	U	5.3	U
Methyl isobutyl ketone (4-Methyl-2-pentanone)	ug/kg	9.8	U	10	U	10.6	U
Toluene	ug/kg	4.9	U	5	U	5.3	U
trans-1,3-Dichloropropene	ug/kg	4.9	U	5	U	5.3	U
1,1,2-Trichloroethane	ug/kg	4.9	U	5	U	5.3	U
2-Hexanone	ug/kg	9.8	UJ	10	UJ	10.6	UJ
Tetrachloroethylene (PCE)	ug/kg	4.9	U	5	U	5.3	U

	StationID	E054SB041		E054SB042		E054SB043	
	SampleID	054SB04101 (0-1ft)		054SB04201 (0-1ft)		054CB04301 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/20/2002		09/20/2002		09/20/2002	
	DateAnalyzed	09/20/2002		09/20/2002		09/20/2002	
	SDGNumber	67237		67237		67237	
Parameter	Units						
Dibromochloromethane	ug/kg	5.3	U	5	U	5.2	U
Chlorobenzene	ug/kg	5.3	U	5	U	5.2	U
Ethylbenzene	ug/kg	5.3	U	5	U	5.2	U
m+p Xylene	ug/kg	5.3	U	5	U	5.2	U
o-Xylene	ug/kg	5.3	U	5	U	5.2	U
Xylenes, Total	ug/kg	5.3	U	5	U	5.2	U
Styrene	ug/kg	5.3	U	5	U	5.2	U
Bromoform	ug/kg	5.3	U	5	U	5.2	U
1,1,2,2-Tetrachloroethane	ug/kg	5.3	U	5	U	5.2	U
1,3-Dichlorobenzene	ug/kg	5.3	U	5	U	5.2	U
1,4-Dichlorobenzene	ug/kg	5.3	U	5	U	5.2	U
1,2-Dichlorobenzene	ug/kg	5.3	U	5	U	5.2	U
1,2,4-Trichlorobenzene	ug/kg	5.3	UJ	5	UJ	5.2	UJ
1,2,3-Trichlorobenzene	ug/kg	5.3	UJ	5	UJ	5.2	UJ

	StationID	E054SB043		E054SB044		E054SB045	
	SampleID	054SB04301 (0-1ft)		054SB04401 (0-1ft)		054SB04501 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/20/2002		09/20/2002		09/20/2002	
	DateAnalyzed	09/20/2002		09/20/2002		09/20/2002	
	SDGNumber	67237		67237		67237	
Parameter	**Units**						
Dibromochloromethane	ug/kg	4.8	U	4.8	U	5.3	U
Chlorobenzene	ug/kg	4.8	U	4.8	U	5.3	U
Ethylbenzene	ug/kg	4.8	U	4.8	U	5.3	U
m+p Xylene	ug/kg	4.8	U	4.8	U	5.3	U
o-Xylene	ug/kg	4.8	U	4.8	U	5.3	U
Xylenes, Total	ug/kg	4.8	U	4.8	U	5.3	U
Styrene	ug/kg	4.8	U	4.8	U	5.3	U
Bromoform	ug/kg	4.8	U	4.8	U	5.3	U
1,1,2,2-Tetrachloroethane	ug/kg	4.8	U	4.8	U	5.3	U
1,3-Dichlorobenzene	ug/kg	4.8	U	4.8	U	5.3	U
1,4-Dichlorobenzene	ug/kg	4.8	U	4.8	U	5.3	U
1,2-Dichlorobenzene	ug/kg	4.8	U	4.8	U	5.3	U
1,2,4-Trichlorobenzene	ug/kg	4.8	UJ	4.8	UJ	5.3	UJ
1,2,3-Trichlorobenzene	ug/kg	4.8	UJ	4.8	UJ	5.3	UJ

	StationID	E054SB046		E054SB047		E054SB052	
	SampleID	054SB04601 (0-1ft)		054SB04701 (0-1ft)		054SB05201 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/20/2002		09/20/2002		09/20/2002	
	DateAnalyzed	09/20/2002		09/20/2002		09/20/2002	
	SDGNumber	67237		67237		67237	
Parameter	Units						
Dibromochloromethane	ug/kg	4.9	U	5	U	5.3	U
Chlorobenzene	ug/kg	4.9	U	5	U	5.3	U
Ethylbenzene	ug/kg	4.9	U	5	U	5.3	U
m+p Xylene	ug/kg	4.9	U	5	U	5.3	U
o-Xylene	ug/kg	4.9	U	5	U	5.3	U
Xylenes, Total	ug/kg	4.9	U	5	U	5.3	U
Styrene	ug/kg	4.9	U	5	U	5.3	U
Bromoform	ug/kg	4.9	U	5	U	5.3	U
1,1,2,2-Tetrachloroethane	ug/kg	4.9	U	5	U	5.3	U
1,3-Dichlorobenzene	ug/kg	4.9	U	5	U	5.3	U
1,4-Dichlorobenzene	ug/kg	4.9	U	5	U	5.3	U
1,2-Dichlorobenzene	ug/kg	4.9	U	5	U	5.3	U
1,2,4-Trichlorobenzene	ug/kg	4.9	UJ	5	UJ	5.3	UJ
1,2,3-Trichlorobenzene	ug/kg	4.9	UJ	5	UJ	5.3	UJ

	StationID	E054SB041		E054SB042		E054SB043	
	SampleID	054SB04101 (0-1ft)		054SB04201 (0-1ft)		054CB04301 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/19/2002		09/17/2002		09/17/2002	
	DateAnalyzed	09/20/2002		09/18/2002		09/19/2002	
	SDGNumber	67237		67237		67237	
Parameter	**Units**						
Benzo(g,h,i)Perylene	ug/kg	138	J	4230	=	398	U
Phenol	ug/kg	373	U	3940	U	398	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	373	U	3940	UJ	398	UJ
Bis(2-Chloroisopropyl)Ether	ug/kg	373	U	3940	U	398	U
2-Chlorophenol	ug/kg	373	U	3940	U	398	U
Benzyl alcohol	ug/kg	373	U	3940	U	398	U
2-Methylphenol (o-Cresol)	ug/kg	373	U	3940	U	398	U
N-Nitrosodi-n-propylamine	ug/kg	373	U	3940	U	398	U
3-Methylphenol/4-Methylphenol (mp-Cresol)	ug/kg	373	U	3940	U	398	U
Hexachloroethane	ug/kg	373	U	3940	U	398	U
Nitrobenzene	ug/kg	373	U	3940	U	398	U
Isophorone	ug/kg	373	U	3940	U	398	U
2-Nitrophenol	ug/kg	373	U	3940	U	398	U
2,4-Dimethylphenol	ug/kg	373	U	3940	U	398	U
bis(2-Chloroethoxy) Methane	ug/kg	373	U	3940	U	398	U
2,4-Dichlorophenol	ug/kg	373	U	3940	U	398	U
Benzoic acid	ug/kg	1810	U	19100	U	1930	U
Naphthalene	ug/kg	373	U	3940	U	398	U
4-Chloroaniline	ug/kg	373	U	3940	U	398	U
Hexachlorobutadiene	ug/kg	373	U	3940	U	398	U
4-Chloro-3-methylphenol	ug/kg	340	U	3580	U	362	U
2-Methylnaphthalene	ug/kg	373	U	3940	U	398	U
Hexachlorocyclopentadiene	ug/kg	373	UJ	3940	UJ	398	UJ
2,4,6-Trichlorophenol	ug/kg	373	U	3940	U	398	U
2,4,5-Trichlorophenol	ug/kg	1810	U	19100	U	1930	U
2-Chloronaphthalene	ug/kg	373	U	3940	U	398	U
2-Nitroaniline	ug/kg	1810	UJ	19100	U	1930	U
3-Nitroaniline	ug/kg	1810	U	19100	U	1930	U
Dimethyl Phthalate	ug/kg	373	U	3940	U	398	U
2,6-Dinitrotoluene	ug/kg	373	U	3940	U	398	U
Acenaphthylene	ug/kg	373	U	3940	U	398	U

	StationID	E054SB043		E054SB044		E054SB045	
	SampleID	054SB04301 (0-1ft)		054SB04401 (0-1ft)		054SB04501 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/17/2002		09/17/2002		09/17/2002	
	DateAnalyzed	09/19/2002		09/19/2002		09/19/2002	
	SDGNumber	67237		67237		67237	
Parameter	**Units**						
Benzo(g,h,i)Perylene	ug/kg	410	U	392	U	383	U
Phenol	ug/kg	410	U	392	U	383	U
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	410	UJ	392	UJ	383	UJ
Bis(2-Chloroisopropyl)Ether	ug/kg	410	U	392	U	383	U
2-Chlorophenol	ug/kg	410	U	392	U	383	U
Benzyl alcohol	ug/kg	410	U	392	U	383	U
2-Methylphenol (o-Cresol)	ug/kg	410	U	392	U	383	U
N-Nitrosodi-n-propylamine	ug/kg	410	U	392	U	383	U
3-Methylphenol/4-Methylphenol (mp-Cresol)	ug/kg	410	U	392	U	383	U
Hexachloroethane	ug/kg	410	U	392	U	383	U
Nitrobenzene	ug/kg	410	U	392	U	383	U
Isophorone	ug/kg	410	U	392	U	383	U
2-Nitrophenol	ug/kg	410	U	392	U	383	U
2,4-Dimethylphenol	ug/kg	410	U	392	U	383	U
bis(2-Chloroethoxy) Methane	ug/kg	410	U	392	U	383	U
2,4-Dichlorophenol	ug/kg	410	U	392	U	383	U
Benzoic acid	ug/kg	1990	U	1900	U	1860	U
Naphthalene	ug/kg	410	U	392	U	383	U
4-Chloroaniline	ug/kg	410	U	392	U	383	U
Hexachlorobutadiene	ug/kg	410	U	392	U	383	U
4-Chloro-3-methylphenol	ug/kg	373	U	356	U	348	U
2-Methylnaphthalene	ug/kg	410	U	392	U	383	U
Hexachlorocyclopentadiene	ug/kg	410	UJ	392	UJ	383	UJ
2,4,6-Trichlorophenol	ug/kg	410	U	392	U	383	U
2,4,5-Trichlorophenol	ug/kg	1990	U	1900	U	1860	U
2-Chloronaphthalene	ug/kg	410	U	392	U	383	U
2-Nitroaniline	ug/kg	1990	U	1900	U	1860	U
3-Nitroaniline	ug/kg	1990	U	1900	U	1860	U
Dimethyl Phthalate	ug/kg	410	U	392	U	383	U
2,6-Dinitrotoluene	ug/kg	410	U	392	U	383	U
Acenaphthylene	ug/kg	410	U	392	U	383	U

	StationID	E054SB046		E054SB047		E054SB052	
	SampleID	054SB04601 (0-1ft)		054SB04701 (0-1ft)		054CB05202 (3-5ft)	
	DateCollected	09/17/2002		09/17/2002		12/20/2002	
	DateExtracted	09/17/2002		09/17/2002		12/23/2002	
	DateAnalyzed	09/19/2002		09/18/2002		12/26/2002	
	SDGNumber	67237		67237		72560	
Parameter	Units						
Benzo(g,h,i)Perylene	ug/kg	370	U	377	U	38.7	UJ
Phenol	ug/kg	370	U	377	U		
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	370	UJ	377	UJ		
Bis(2-Chloroisopropyl)Ether	ug/kg	370	U	377	U		
2-Chlorophenol	ug/kg	370	U	377	U		
Benzyl alcohol	ug/kg	370	U	377	U		
2-Methylphenol (o-Cresol)	ug/kg	370	U	377	U		
N-Nitrosodi-n-propylamine	ug/kg	370	U	377	U		
3-Methylphenol/4-Methylphenol (mp-Cresol)	ug/kg	370	U	377	U		
Hexachloroethane	ug/kg	370	U	377	U		
Nitrobenzene	ug/kg	370	U	377	U		
Isophorone	ug/kg	370	U	377	U		
2-Nitrophenol	ug/kg	370	U	377	U		
2,4-Dimethylphenol	ug/kg	370	U	377	U		
bis(2-Chloroethoxy) Methane	ug/kg	370	U	377	U		
2,4-Dichlorophenol	ug/kg	370	U	377	U		
Benzoic acid	ug/kg	1790	U	1830	U		
Naphthalene	ug/kg	370	U	377	U	38.7	U
4-Chloroaniline	ug/kg	370	U	377	U		
Hexachlorobutadiene	ug/kg	370	U	377	U		
4-Chloro-3-methylphenol	ug/kg	336	U	343	U		
2-Methylnaphthalene	ug/kg	370	U	377	U		
Hexachlorocyclopentadiene	ug/kg	370	UJ	377	UJ		
2,4,6-Trichlorophenol	ug/kg	370	U	377	U		
2,4,5-Trichlorophenol	ug/kg	1790	U	1830	U		
2-Chloronaphthalene	ug/kg	370	U	377	U		
2-Nitroaniline	ug/kg	1790	U	1830	U		
3-Nitroaniline	ug/kg	1790	U	1830	U		
Dimethyl Phthalate	ug/kg	370	U	377	U		
2,6-Dinitrotoluene	ug/kg	370	U	377	U		
Acenaphthylene	ug/kg	370	U	377	U	38.7	U

	StationID	E054SB052		E054SB052		E054SB053	
	SampleID	054SB05201 (0-1ft)		054SB05202 (3-5ft)		054SB05302 (3-5ft)	
	DateCollected	09/17/2002		12/20/2002		12/20/2002	
	DateExtracted	09/17/2002		12/23/2002		12/23/2002	
	DateAnalyzed	09/18/2002		12/26/2002		12/26/2002	
	SDGNumber	67237		72560		72560	
Parameter	**Units**						
Benzo(g,h,i)Perylene	ug/kg	310	J	39.4	UJ	1320	J
Phenol	ug/kg	1420	U				
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg	1420	UJ				
Bis(2-Chloroisopropyl)Ether	ug/kg	1420	U				
2-Chlorophenol	ug/kg	1420	U				
Benzyl alcohol	ug/kg	1420	U				
2-Methylphenol (o-Cresol)	ug/kg	1420	U				
N-Nitrosodi-n-propylamine	ug/kg	1420	U				
3-Methylphenol/4-Methylphenol (mp-Cresol)	ug/kg	1420	U				
Hexachloroethane	ug/kg	1420	U				
Nitrobenzene	ug/kg	1420	U				
Isophorone	ug/kg	1420	U				
2-Nitrophenol	ug/kg	1420	U				
2,4-Dimethylphenol	ug/kg	1420	U				
bis(2-Chloroethoxy) Methane	ug/kg	1420	U				
2,4-Dichlorophenol	ug/kg	1420	U				
Benzoic acid	ug/kg	6890	U				
Naphthalene	ug/kg	1420	U	39.4	U	174	U
4-Chloroaniline	ug/kg	1420	U				
Hexachlorobutadiene	ug/kg	1420	U				
4-Chloro-3-methylphenol	ug/kg	1290	U				
2-Methylnaphthalene	ug/kg	1420	U				
Hexachlorocyclopentadiene	ug/kg	1420	UJ				
2,4,6-Trichlorophenol	ug/kg	1420	U				
2,4,5-Trichlorophenol	ug/kg	6890	U				
2-Chloronaphthalene	ug/kg	1420	U				
2-Nitroaniline	ug/kg	6890	U				
3-Nitroaniline	ug/kg	6890	U				
Dimethyl Phthalate	ug/kg	1420	U				
2,6-Dinitrotoluene	ug/kg	1420	U				
Acenaphthylene	ug/kg	1420	U	39.4	U	174	U

	StationID	E054SB054		E054SB055		E054SB056	
	SampleID	054SB05402 (3-5ft)		054SB05503 (1-2ft)		054SB05601 (0-1ft)	
	DateCollected	12/20/2002		12/20/2002		12/20/2002	
	DateExtracted	12/23/2002		12/23/2002		12/23/2002	
	DateAnalyzed	12/31/2002		12/26/2002		12/26/2002	
	SDGNumber	72560		72560		72560	
Parameter	Units						
Benzo(g,h,i)Perylene	ug/kg	38.5	U	905	J	665	J
Phenol	ug/kg						
bis(2-Chloroethyl) ether (2-Chloroethyl Ether)	ug/kg						
Bis(2-Chloroisopropyl)Ether	ug/kg						
2-Chlorophenol	ug/kg						
Benzyl alcohol	ug/kg						
2-Methylphenol (o-Cresol)	ug/kg						
N-Nitrosodi-n-propylamine	ug/kg						
3-Methylphenol/4-Methylphenol (mp-Cresol)	ug/kg						
Hexachloroethane	ug/kg						
Nitrobenzene	ug/kg						
Isophorone	ug/kg						
2-Nitrophenol	ug/kg						
2,4-Dimethylphenol	ug/kg						
bis(2-Chloroethoxy) Methane	ug/kg						
2,4-Dichlorophenol	ug/kg						
Benzoic acid	ug/kg						
Naphthalene	ug/kg	38.5	U	162	U	36.5	U
4-Chloroaniline	ug/kg						
Hexachlorobutadiene	ug/kg						
4-Chloro-3-methylphenol	ug/kg						
2-Methylnaphthalene	ug/kg						
Hexachlorocyclopentadiene	ug/kg						
2,4,6-Trichlorophenol	ug/kg						
2,4,5-Trichlorophenol	ug/kg						
2-Chloronaphthalene	ug/kg						
2-Nitroaniline	ug/kg						
3-Nitroaniline	ug/kg						
Dimethyl Phthalate	ug/kg						
2,6-Dinitrotoluene	ug/kg						
Acenaphthylene	ug/kg	38.5	U	162	U	144	=

	StationID	E054SB041		E054SB042		E054SB043	
	SampleID	054SB04101 (0-1ft)		054SB04201 (0-1ft)		054CB04301 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/19/2002		09/17/2002		09/17/2002	
	DateAnalyzed	09/20/2002		09/18/2002		09/19/2002	
	SDGNumber	67237		67237		67237	
Parameter	Units						
Acenaphthene	ug/kg	25.5	J	161	J	362	U
2,4-Dinitrophenol	ug/kg	1810	UJ	19100	UJ	1930	UJ
Dibenzofuran	ug/kg	373	U	3940	U	398	U
2,4-Dinitrotoluene	ug/kg	340	U	3580	U	362	U
Diethyl Phthalate	ug/kg	373	U	3940	U	398	U
4-Nitrophenol	ug/kg	1810	UJ	19100	U	1930	U
Fluorene	ug/kg	21.3	J	3940	U	398	U
4-Chlorophenyl Phenyl Ether	ug/kg	373	U	3940	U	398	U
4,6-Dinitro-2-methylphenol	ug/kg	1810	UJ	19100	U	1930	U
4-Nitroaniline	ug/kg	1810	U	19100	U	1930	U
Diphenylamine	ug/kg	373	U	3940	U	398	U
4-Bromophenyl Phenyl Ether	ug/kg	373	U	3940	U	398	U
Hexachlorobenzene	ug/kg	373	U	3940	U	398	U
Pentachlorophenol	ug/kg	1810	U	19100	U	1930	U
Phenanthrene	ug/kg	345	J	6200	=	21.2	J
Anthracene	ug/kg	69	J	1170	J	398	U
Di-n-butyl Phthalate	ug/kg	373	U	3940	U	398	U
Fluoranthene	ug/kg	541	=	16600	=	69.9	J
Pyrene	ug/kg	570	J	13600	=	61.5	J
Benzyl Butyl Phthalate	ug/kg	373	U	3940	U	398	U
Benzo(a)Anthracene	ug/kg	292	J	7630	=	398	U
3,3'-Dichlorobenzidine	ug/kg	746	U	7870	U	795	U
Chrysene	ug/kg	296	J	7490	=	55.9	J
bis(2-Ethylhexyl) Phthalate	ug/kg	373	U	3940	U	398	U
Di-n-octylphthalate	ug/kg	373	UJ	3940	U	398	U
Benzo(b)Fluoranthene	ug/kg	445	=	12000	=	92.1	J
Benzo(k)Fluoranthene	ug/kg	373	U	3940	U	398	U
Benzo(a)Pyrene	ug/kg	314	J	7750	=	55.4	J
Indeno(1,2,3-c,d)pyrene	ug/kg	288	J	4030	=	398	U
Dibenz(a,h)anthracene	ug/kg	373	U	3940	U	398	U
Carbazole	ug/kg	27	J	3940	U	398	U

	StationID	E054SB043		E054SB044		E054SB045	
	SampleID	054SB04301 (0-1ft)		054SB04401 (0-1ft)		054SB04501 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/17/2002		09/17/2002		09/17/2002	
	DateAnalyzed	09/19/2002		09/19/2002		09/19/2002	
	SDGNumber	67237		67237		67237	
Parameter	**Units**						
Acenaphthene	ug/kg	373	U	356	U	348	U
2,4-Dinitrophenol	ug/kg	1990	UJ	1900	UJ	1860	UJ
Dibenzofuran	ug/kg	410	U	392	U	383	U
2,4-Dinitrotoluene	ug/kg	373	U	356	U	348	U
Diethyl Phthalate	ug/kg	410	U	392	U	383	U
4-Nitrophenol	ug/kg	1990	U	1900	U	1860	U
Fluorene	ug/kg	410	U	392	U	383	U
4-Chlorophenyl Phenyl Ether	ug/kg	410	U	392	U	383	U
4,6-Dinitro-2-methylphenol	ug/kg	1990	U	1900	U	1860	U
4-Nitroaniline	ug/kg	1990	U	1900	U	1860	U
Diphenylamine	ug/kg	410	U	392	U	383	U
4-Bromophenyl Phenyl Ether	ug/kg	410	U	392	U	383	U
Hexachlorobenzene	ug/kg	410	U	392	U	383	U
Pentachlorophenol	ug/kg	1990	U	1900	U	1860	U
Phenanthrene	ug/kg	40.4	J	392	U	37.6	J
Anthracene	ug/kg	410	U	392	U	383	U
Di-n-butyl Phthalate	ug/kg	410	U	392	U	132	J
Fluoranthene	ug/kg	90.1	J	392	U	383	U
Pyrene	ug/kg	83.3	J	392	U	82	J
Benzyl Butyl Phthalate	ug/kg	410	U	392	U	383	U
Benzo(a)Anthracene	ug/kg	410	U	392	U	383	U
3,3'-Dichlorobenzidine	ug/kg	819	U	782	U	765	U
Chrysene	ug/kg	56.7	J	392	U	383	U
bis(2-Ethylhexyl) Phthalate	ug/kg	410	U	392	U	383	U
Di-n-octylphthalate	ug/kg	410	U	392	U	383	U
Benzo(b)Fluoranthene	ug/kg	77.6	J	392	U	95.4	J
Benzo(k)Fluoranthene	ug/kg	410	U	392	U	383	U
Benzo(a)Pyrene	ug/kg	57	J	392	U	45.5	J
Indeno(1,2,3-c,d)pyrene	ug/kg	410	U	392	U	383	U
Dibenz(a,h)anthracene	ug/kg	410	U	392	U	383	U
Carbazole	ug/kg	410	U	392	U	383	U

	StationID	E054SB046		E054SB047		E054SB052	
	SampleID	054SB04601 (0-1ft)		054SB04701 (0-1ft)		054CB05202 (3-5ft)	
	DateCollected	09/17/2002		09/17/2002		12/20/2002	
	DateExtracted	09/17/2002		09/17/2002		12/23/2002	
	DateAnalyzed	09/19/2002		09/18/2002		12/26/2002	
	SDGNumber	67237		67237		72560	
Parameter	Units						
Acenaphthene	ug/kg	336	U	343	U	38.7	U
2,4-Dinitrophenol	ug/kg	1790	UJ	1830	UJ		
Dibenzofuran	ug/kg	370	U	377	U		
2,4-Dinitrotoluene	ug/kg	336	U	343	U		
Diethyl Phthalate	ug/kg	370	U	377	U		
4-Nitrophenol	ug/kg	1790	U	1830	U		
Fluorene	ug/kg	370	U	377	U	38.7	U
4-Chlorophenyl Phenyl Ether	ug/kg	370	U	377	U		
4,6-Dinitro-2-methylphenol	ug/kg	1790	U	1830	U		
4-Nitroaniline	ug/kg	1790	U	1830	U		
Diphenylamine	ug/kg	370	U	377	U		
4-Bromophenyl Phenyl Ether	ug/kg	370	U	377	U		
Hexachlorobenzene	ug/kg	370	U	377	U		
Pentachlorophenol	ug/kg	1790	U	1830	U		
Phenanthrene	ug/kg	370	U	377	U	38.7	U
Anthracene	ug/kg	370	U	377	U	38.7	U
Di-n-butyl Phthalate	ug/kg	29.5	J	377	U		
Fluoranthene	ug/kg	37.6	J	377	U	20.6	J
Pyrene	ug/kg	29.4	J	377	U	32.7	J
Benzyl Butyl Phthalate	ug/kg	370	U	377	U		
Benzo(a)Anthracene	ug/kg	370	U	377	U	38.7	U
3,3'-Dichlorobenzidine	ug/kg	739	U	753	U		
Chrysene	ug/kg	370	U	377	U	38.7	U
bis(2-Ethylhexyl) Phthalate	ug/kg	370	U	377	U		
Di-n-octylphthalate	ug/kg	370	U	377	U		
Benzo(b)Fluoranthene	ug/kg	27.2	J	377	U	38.7	U
Benzo(k)Fluoranthene	ug/kg	370	U	377	U	38.7	U
Benzo(a)Pyrene	ug/kg	21.4	J	377	U	38.7	U
Indeno(1,2,3-c,d)pyrene	ug/kg	370	U	377	U	38.7	UJ
Dibenz(a,h)anthracene	ug/kg	370	U	377	U	38.7	UJ
Carbazole	ug/kg	370	U	377	U		

	StationID	E054SB052		E054SB052		E054SB053	
	SampleID	054SB05201 (0-1ft)		054SB05202 (3-5ft)		054SB05302 (3-5ft)	
	DateCollected	09/17/2002		12/20/2002		12/20/2002	
	DateExtracted	09/17/2002		12/23/2002		12/23/2002	
	DateAnalyzed	09/18/2002		12/26/2002		12/26/2002	
	SDGNumber	67237		72560		72560	
Parameter	Units						
Acenaphthene	ug/kg	59.6	J	39.4	U	174	U
2,4-Dinitrophenol	ug/kg	6890	UJ				
Dibenzofuran	ug/kg	1420	U				
2,4-Dinitrotoluene	ug/kg	1290	U				
Diethyl Phthalate	ug/kg	1420	U				
4-Nitrophenol	ug/kg	6890	U				
Fluorene	ug/kg	1420	U	39.4	U	54.9	J
4-Chlorophenyl Phenyl Ether	ug/kg	1420	U				
4,6-Dinitro-2-methylphenol	ug/kg	6890	U				
4-Nitroaniline	ug/kg	6890	U				
Diphenylamine	ug/kg	1420	U				
4-Bromophenyl Phenyl Ether	ug/kg	1420	U				
Hexachlorobenzene	ug/kg	1420	U				
Pentachlorophenol	ug/kg	6890	U				
Phenanthrene	ug/kg	776	J	37.6	J	1120	=
Anthracene	ug/kg	128	J	39.4	U	370	=
Di-n-butyl Phthalate	ug/kg	1420	U				
Fluoranthene	ug/kg	3630	=	51.2	=	4260	=
Pyrene	ug/kg	2880	=	69.3	J	5190	J
Benzyl Butyl Phthalate	ug/kg	1420	U				
Benzo(a)Anthracene	ug/kg	1330	J	39.4	U	3570	=
3,3'-Dichlorobenzidine	ug/kg	2840	U				
Chrysene	ug/kg	1310	J	36	J	3540	=
bis(2-Ethylhexyl) Phthalate	ug/kg	2240	U				
Di-n-octylphthalate	ug/kg	1420	U				
Benzo(b)Fluoranthene	ug/kg	1370	J	196	=	6580	=
Benzo(k)Fluoranthene	ug/kg	1420	U	39.4	U	704	=
Benzo(a)Pyrene	ug/kg	750	J	39.4	U	3680	=
Indeno(1,2,3-c,d)pyrene	ug/kg	294	J	39.4	UJ	1410	J
Dibenz(a,h)anthracene	ug/kg	98.5	J	39.4	UJ	174	UJ
Carbazole	ug/kg	127	J				

	StationID	E054SB054		E054SB055		E054SB056	
	SampleID	054SB05402 (3-5ft)		054SB05503 (1-2ft)		054SB05601 (0-1ft)	
	DateCollected	12/20/2002		12/20/2002		12/20/2002	
	DateExtracted	12/23/2002		12/23/2002		12/23/2002	
	DateAnalyzed	12/31/2002		12/26/2002		12/26/2002	
	SDGNumber	72560		72560		72560	
Parameter	**Units**						
Acenaphthene	ug/kg	38.5	U	162	U	9.6	J
2,4-Dinitrophenol	ug/kg						
Dibenzofuran	ug/kg						
2,4-Dinitrotoluene	ug/kg						
Diethyl Phthalate	ug/kg						
4-Nitrophenol	ug/kg						
Fluorene	ug/kg	38.5	U	20.8	J	7	J
4-Chlorophenyl Phenyl Ether	ug/kg						
4,6-Dinitro-2-methylphenol	ug/kg						
4-Nitroaniline	ug/kg						
Diphenylamine	ug/kg						
4-Bromophenyl Phenyl Ether	ug/kg						
Hexachlorobenzene	ug/kg						
Pentachlorophenol	ug/kg						
Phenanthrene	ug/kg	23	J	856	=	33	J
Anthracene	ug/kg	38.5	UJ	158	J	64.6	=
Di-n-butyl Phthalate	ug/kg						
Fluoranthene	ug/kg	43.6	J	2370	=	458	=
Pyrene	ug/kg	63.6	J	3220	J	1420	J
Benzyl Butyl Phthalate	ug/kg						
Benzo(a)Anthracene	ug/kg	38.5	U	1380	=	698	=
3,3'-Dichlorobenzidine	ug/kg						
Chrysene	ug/kg	38.5	U	1450	=	897	=
bis(2-Ethylhexyl) Phthalate	ug/kg						
Di-n-octylphthalate	ug/kg						
Benzo(b)Fluoranthene	ug/kg	38.5	U	3070	=	2760	=
Benzo(k)Fluoranthene	ug/kg	38.5	U	258	=	320	=
Benzo(a)Pyrene	ug/kg	38.5	U	1550	=	1220	=
Indeno(1,2,3-c,d)pyrene	ug/kg	38.5	U	832	J	595	J
Dibenz(a,h)anthracene	ug/kg	38.5	U	162	UJ	36.5	UJ
Carbazole	ug/kg						

	StationID	E054SB057		E054SB057		E054SB058	
	SampleID	054SB05701 (0-1ft)		054SB05701DL (0-1ft)		054SB05801 (0-1ft)	
	DateCollected	12/20/2002		12/20/2002		12/20/2002	
	DateExtracted	12/23/2002		12/23/2002		12/23/2002	
	DateAnalyzed	12/26/2002		12/31/2002		01/01/2003	
	SDGNumber	72560		72560		72560	
Parameter	Units						
Acenaphthene	ug/kg	62.8	=	64.2	R	35	U
2,4-Dinitrophenol	ug/kg						
Dibenzofuran	ug/kg						
2,4-Dinitrotoluene	ug/kg						
Diethyl Phthalate	ug/kg						
4-Nitrophenol	ug/kg						
Fluorene	ug/kg	15.5	J	141	R	35	U
4-Chlorophenyl Phenyl Ether	ug/kg						
4,6-Dinitro-2-methylphenol	ug/kg						
4-Nitroaniline	ug/kg						
Diphenylamine	ug/kg						
4-Bromophenyl Phenyl Ether	ug/kg						
Hexachlorobenzene	ug/kg						
Pentachlorophenol	ug/kg						
Phenanthrene	ug/kg	707	=	674	R	158	=
Anthracene	ug/kg	122	=	110	R	21.7	J
Di-n-butyl Phthalate	ug/kg						
Fluoranthene	ug/kg	3440	=	2900	R	389	=
Pyrene	ug/kg	4560	R	4440	=	486	=
Benzyl Butyl Phthalate	ug/kg						
Benzo(a)Anthracene	ug/kg	1470	=	1530	R	193	=
3,3'-Dichlorobenzidine	ug/kg						
Chrysene	ug/kg	1350	=	1380	R	185	=
bis(2-Ethylhexyl) Phthalate	ug/kg						
Di-n-octylphthalate	ug/kg						
Benzo(b)Fluoranthene	ug/kg	2060	=	1980	R	324	=
Benzo(k)Fluoranthene	ug/kg	204	=	141	R	35	U
Benzo(a)Pyrene	ug/kg	976	=	919	R	150	=
Indeno(1,2,3-c,d)pyrene	ug/kg	381	J	342	R	65.2	=
Dibenz(a,h)anthracene	ug/kg	35.3	UJ	141	R	35	U
Carbazole	ug/kg						

	StationID	E054SB059		E054SB060		E054SB061	
	SampleID	054SB05901 (0-1ft)		054SB06001 (0-1ft)		054SB06101 (0-1ft)	
	DateCollected	12/20/2002		01/23/2003		01/23/2003	
	DateExtracted	12/23/2002		01/23/2003		01/23/2003	
	DateAnalyzed	12/26/2002		01/24/2003		01/26/2003	
	SDGNumber	72560		73864		73864	
Parameter	**Units**						
Acenaphthene	ug/kg	149	U	37.4	U	55.6	J
2,4-Dinitrophenol	ug/kg						
Dibenzofuran	ug/kg						
2,4-Dinitrotoluene	ug/kg						
Diethyl Phthalate	ug/kg						
4-Nitrophenol	ug/kg						
Fluorene	ug/kg	149	U	37.4	U	32	J
4-Chlorophenyl Phenyl Ether	ug/kg						
4,6-Dinitro-2-methylphenol	ug/kg						
4-Nitroaniline	ug/kg						
Diphenylamine	ug/kg						
4-Bromophenyl Phenyl Ether	ug/kg						
Hexachlorobenzene	ug/kg						
Pentachlorophenol	ug/kg						
Phenanthrene	ug/kg	159	=	26	J	1140	=
Anthracene	ug/kg	149	U	37.4	U	215	=
Di-n-butyl Phthalate	ug/kg						
Fluoranthene	ug/kg	491	=	142	=	1520	=
Pyrene	ug/kg	741	=	229	=	1650	=
Benzyl Butyl Phthalate	ug/kg						
Benzo(a)Anthracene	ug/kg	324	=	102	=	850	=
3,3'-Dichlorobenzidine	ug/kg						
Chrysene	ug/kg	330	=	143	=	906	=
bis(2-Ethylhexyl) Phthalate	ug/kg						
Di-n-octylphthalate	ug/kg						
Benzo(b)Fluoranthene	ug/kg	1100	=	230	=	1430	=
Benzo(k)Fluoranthene	ug/kg	149	U	37.4	U	145	U
Benzo(a)Pyrene	ug/kg	334	=	127	=	659	=
Indeno(1,2,3-c,d)pyrene	ug/kg	190	=	89.5	=	293	=
Dibenz(a,h)anthracene	ug/kg	149	U	37.4	U	145	U
Carbazole	ug/kg						

	StationID	E054SB041		E054SB041		E054SB042		E054SB042		E054SB043	
	SampleID	054SB04101 (0-1ft)		054SB04101 (0-1ft)		054SB04201 (0-1ft)		054SB04201 (0-1ft)		054CB04301 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/24/2002		09/24/2002		09/24/2002		09/24/2002		09/24/2002	
	DateAnalyzed	09/25/2002		09/30/2002		09/25/2002		09/30/2002		09/25/2002	
	SDGNumber	67238		67238		67238		67238		67238	
Parameter	Units										
Aluminum	mg/kg			5330	=			6900	=		
Antimony	mg/kg			5.9	J			0.519	UJ		
Antimony, SPLP	mg/L										
Arsenic	mg/kg			5.19	=			4.54	=		
Arsenic, TCLP	mg/L										
Barium	mg/kg			88.3	J			57	J		
Barium, TCLP	mg/L										
Beryllium	mg/kg			0.382	J			0.39	J		
Cadmium	mg/kg			2.85	=			0.155	J		
Cadmium, TCLP	mg/L										
Calcium	mg/kg			2580	=			5330	=		
Chromium, Total	mg/kg			104	=			12	=		
Chromium, TCLP	mg/L										
Cobalt	mg/kg			4.11	J			2.79	J		
Copper	mg/kg			253	J			36.1	J		
Iron	mg/kg			16800	J			13100	J		
Lead	mg/kg			673	J			135	J		
Lead, SPLP	mg/L										
Lead, TCLP	mg/L										
Magnesium	mg/kg			608	J			826	J		
Manganese	mg/kg			128	J			89	J		
Nickel	mg/kg			21.7	=			7.2	J		
Potassium	mg/kg			342	J			553	J		
Selenium	mg/kg			1.05	J			1.07	J		
Selenium, TCLP	mg/L										
Silver	mg/kg			0.826	J			0.124	U		
Silver, TCLP	mg/L										
Sodium	mg/kg			73.8	J			94.8	J		
Thallium	mg/kg			0.535	U			0.54	U		
Thallium, SPLP	mg/L										
Vanadium	mg/kg			10.7	J			17.2	=		
Zinc	mg/kg			1050	=			133	=		
Mercury	mg/kg	2.74	=			0.19	=			0.28	=
Mercury, SPLP	mg/L										
Mercury, TCLP	mg/L										

	StationID	E054SB043		E054SB043		E054SB043		E054SB044		E054SB044	
	SampleID	054CB04301 (0-1ft)		054SB04301 (0-1ft)		054SB04301 (0-1ft)		054SB04401 (0-1ft)		054SB04401 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/24/2002		09/24/2002		09/24/2002		09/24/2002		09/24/2002	
	DateAnalyzed	09/30/2002		09/25/2002		09/30/2002		09/25/2002		09/30/2002	
	SDGNumber	67238		67238		67238		67238		67238	
Parameter	Units										
Aluminum	mg/kg	7270	=			9200	=			14600	=
Antimony	mg/kg	2.48	J			0.576	UJ			0.565	UJ
Antimony, SPLP	mg/L										
Arsenic	mg/kg	11.7	=			4.84	=			4.4	=
Arsenic, TCLP	mg/L										
Barium	mg/kg	39.1	J			43.1	J			19.5	J
Barium, TCLP	mg/L										
Beryllium	mg/kg	0.33	J			0.331	J			0.107	U
Cadmium	mg/kg	0.023	U			0.138	J			0.025	U
Cadmium, TCLP	mg/L										
Calcium	mg/kg	11100	=			6360	=			265	J
Chromium, Total	mg/kg	59.9	=			19.4	=			13	=
Chromium, TCLP	mg/L										
Cobalt	mg/kg	3.5	J			1.71	J			0.619	J
Copper	mg/kg	85.6	J			84.9	J			1.92	J
Iron	mg/kg	91200	J			10300	J			12500	J
Lead	mg/kg	116	J			215	J			8.21	J
Lead, SPLP	mg/L										
Lead, TCLP	mg/L										
Magnesium	mg/kg	1170	J			1180	J			684	J
Manganese	mg/kg	441	J			64.5	J			15.2	J
Nickel	mg/kg	16.6	=			8.42	J			2.87	J
Potassium	mg/kg	499	J			528	J			463	J
Selenium	mg/kg	5.2	=			0.502	J			0.926	J
Selenium, TCLP	mg/L										
Silver	mg/kg	0.231	U			0.138	U			0.135	U
Silver, TCLP	mg/L										
Sodium	mg/kg	818	J			883	J			1130	J
Thallium	mg/kg	1.36	U			0.599	U			0.587	U
Thallium, SPLP	mg/L										
Vanadium	mg/kg	14.3	=			16.1	=			19.2	=
Zinc	mg/kg	211	=			177	=			11.9	=
Mercury	mg/kg			0.271	=			0.065	J		
Mercury, SPLP	mg/L										
Mercury, TCLP	mg/L										

	StationID	E054SB045		E054SB045		E054SB046		E054SB046		E054SB047	
	SampleID	054SB04501 (0-1ft)		054SB04501 (0-1ft)		054SB04601 (0-1ft)		054SB04601 (0-1ft)		054SB04701 (0-1ft)	
	DateCollected	09/17/2002		09/17/2002		09/17/2002		09/17/2002		09/17/2002	
	DateExtracted	09/24/2002		09/24/2002		09/24/2002		09/24/2002		09/24/2002	
	DateAnalyzed	09/25/2002		09/30/2002		09/25/2002		09/30/2002		09/25/2002	
	SDGNumber	67238		67238		67238		67238		67238	
Parameter	Units										
Aluminum	mg/kg			6980	=			8530	=		
Antimony	mg/kg			10.9	J			0.523	UJ		
Antimony, SPLP	mg/L										
Arsenic	mg/kg			4.84	=			3.79	=		
Arsenic, TCLP	mg/L										
Barium	mg/kg			122	J			26.8	J		
Barium, TCLP	mg/L										
Beryllium	mg/kg			7.49	=			0.32	J		
Cadmium	mg/kg			1.65	=			0.338	J		
Cadmium, TCLP	mg/L										
Calcium	mg/kg			3720	=			16500	=		
Chromium, Total	mg/kg			117	=			17.8	=		
Chromium, TCLP	mg/L										
Cobalt	mg/kg			11.4	=			1.66	J		
Copper	mg/kg			523	J			25.3	J		
Iron	mg/kg			27300	J			8120	J		
Lead	mg/kg			643	J			118	J		
Lead, SPLP	mg/L										
Lead, TCLP	mg/L										
Magnesium	mg/kg			1120	J			919	J		
Manganese	mg/kg			244	J			50.3	J		
Nickel	mg/kg			26.4	=			5.28	J		
Potassium	mg/kg			572	J			394	J		
Selenium	mg/kg			1.71	=			0.291	U		
Selenium, TCLP	mg/L										
Silver	mg/kg			0.575	J			0.125	U		
Silver, TCLP	mg/L										
Sodium	mg/kg			813	J			95.1	J		
Thallium	mg/kg			0.547	U			0.544	U		
Thallium, SPLP	mg/L										
Vanadium	mg/kg			12.3	=			13.3	=		
Zinc	mg/kg			2990	=			97.6	=		
Mercury	mg/kg	1.31	=			0.208	=			0.068	J
Mercury, SPLP	mg/L										
Mercury, TCLP	mg/L										

	StationID	E054SB047		E054SB048		E054SB048		E054SB048		E054SB048	
	SampleID	054SB04701 (0-1ft)		054SB04801 (0-1ft)		054SB04801 (0-1ft)		054SB04801 (0-1ft)		054SB04801 (0-1ft)	
	DateCollected	09/17/2002		09/16/2002		09/16/2002		09/16/2002		09/16/2002	
	DateExtracted	09/24/2002		09/20/2002		09/24/2002		10/07/2002		10/07/2002	
	DateAnalyzed	09/30/2002		10/01/2002		09/25/2002		10/09/2002		10/08/2002	
	SDGNumber	67238		67242		67242		68128		68128	
Parameter	Units										
Aluminum	mg/kg	8660	=								
Antimony	mg/kg	0.545	J					2.07	J		
Antimony, SPLP	mg/L			0.048	U						
Arsenic	mg/kg	1.51	J								
Arsenic, TCLP	mg/L										
Barium	mg/kg	24.6	J								
Barium, TCLP	mg/L										
Beryllium	mg/kg	0.256	J								
Cadmium	mg/kg	0.087	U								
Cadmium, TCLP	mg/L										
Calcium	mg/kg	1870	=								
Chromium, Total	mg/kg	12.5	=								
Chromium, TCLP	mg/L										
Cobalt	mg/kg	2.01	J								
Copper	mg/kg	31	J								
Iron	mg/kg	4850	J								
Lead	mg/kg	47.4	J					365	=		
Lead, SPLP	mg/L			0.012	U						
Lead, TCLP	mg/L										
Magnesium	mg/kg	405	J								
Manganese	mg/kg	26.1	J								
Nickel	mg/kg	5.99	J								
Potassium	mg/kg	262	J								
Selenium	mg/kg	0.339	J								
Selenium, TCLP	mg/L										
Silver	mg/kg	0.13	U								
Silver, TCLP	mg/L										
Sodium	mg/kg	60.5	J								
Thallium	mg/kg	0.562	U					0.559	U		
Thallium, SPLP	mg/L			0.05	U						
Vanadium	mg/kg	11.5	=								
Zinc	mg/kg	189	=								
Mercury	mg/kg									0.214	J
Mercury, SPLP	mg/L					0.0004	UJ				
Mercury, TCLP	mg/L										

	StationID	E054SB048		E054SB048		E054SB048		E054SB048		E054SB049	
	SampleID	054SB04802 (3-5ft)		054SB04802 (3-5ft)		054SB04802 (3-5ft)		054SB04802 (3-5ft)		054SB04901 (0-1ft)	
	DateCollected	09/16/2002		09/16/2002		09/16/2002		09/16/2002		09/16/2002	
	DateExtracted	09/20/2002		09/24/2002		10/07/2002		10/07/2002		09/20/2002	
	DateAnalyzed	10/01/2002		09/25/2002		10/09/2002		10/08/2002		10/01/2002	
	SDGNumber	67242		67242		68128		68128		67242	
Parameter	Units										
Aluminum	mg/kg										
Antimony	mg/kg					532	J				
Antimony, SPLP	mg/L	0.048	U							0.048	U
Arsenic	mg/kg										
Arsenic, TCLP	mg/L										
Barium	mg/kg										
Barium, TCLP	mg/L										
Beryllium	mg/kg										
Cadmium	mg/kg										
Cadmium, TCLP	mg/L										
Calcium	mg/kg										
Chromium, Total	mg/kg										
Chromium, TCLP	mg/L										
Cobalt	mg/kg										
Copper	mg/kg										
Iron	mg/kg										
Lead	mg/kg					12100	=				
Lead, SPLP	mg/L	0.012	U							0.144	J
Lead, TCLP	mg/L										
Magnesium	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg										
Potassium	mg/kg										
Selenium	mg/kg										
Selenium, TCLP	mg/L										
Silver	mg/kg										
Silver, TCLP	mg/L										
Sodium	mg/kg										
Thallium	mg/kg					6.2	U				
Thallium, SPLP	mg/L	0.05	U							0.06	U
Vanadium	mg/kg										
Zinc	mg/kg										
Mercury	mg/kg							0.684	J		
Mercury, SPLP	mg/L			0.0004	UJ						
Mercury, TCLP	mg/L										

	StationID	E054SB049		E054SB049		E054SB049		E054SB049		E054SB049	
	SampleID	054SB04901 (0-1ft)		054SB04901 (0-1ft)		054SB04901 (0-1ft)		054SB04902 (3-5ft)		054SB04902 (3-5ft)	
	DateCollected	09/16/2002		09/16/2002		09/16/2002		09/16/2002		09/16/2002	
	DateExtracted	09/24/2002		10/07/2002		10/07/2002		09/20/2002		09/24/2002	
	DateAnalyzed	09/25/2002		10/09/2002		10/08/2002		10/01/2002		09/25/2002	
	SDGNumber	67242		68128		68128		67242		67242	
Parameter	Units										
Aluminum	mg/kg										
Antimony	mg/kg			4.47	J						
Antimony, SPLP	mg/L							0.048	U		
Arsenic	mg/kg										
Arsenic, TCLP	mg/L										
Barium	mg/kg										
Barium, TCLP	mg/L										
Beryllium	mg/kg										
Cadmium	mg/kg										
Cadmium, TCLP	mg/L										
Calcium	mg/kg										
Chromium, Total	mg/kg										
Chromium, TCLP	mg/L										
Cobalt	mg/kg										
Copper	mg/kg										
Iron	mg/kg										
Lead	mg/kg			822	=						
Lead, SPLP	mg/L							0.191	J		
Lead, TCLP	mg/L										
Magnesium	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg										
Potassium	mg/kg										
Selenium	mg/kg										
Selenium, TCLP	mg/L										
Silver	mg/kg										
Silver, TCLP	mg/L										
Sodium	mg/kg										
Thallium	mg/kg			1.2	U						
Thallium, SPLP	mg/L							0.05	U		
Vanadium	mg/kg										
Zinc	mg/kg										
Mercury	mg/kg					0.635	J				
Mercury, SPLP	mg/L	0.0004	UJ							0.0004	UJ
Mercury, TCLP	mg/L										

	StationID	E054SB049		E054SB049		E054SB050		E054SB050		E054SB050	
	SampleID	054SB04902 (3-5ft)		054SB04902 (3-5ft)		054SB05001 (0-1ft)		054SB05001 (0-1ft)		054SB05001 (0-1ft)	
	DateCollected	09/16/2002		09/16/2002		09/16/2002		09/16/2002		09/16/2002	
	DateExtracted	10/07/2002		10/07/2002		09/20/2002		09/24/2002		10/07/2002	
	DateAnalyzed	10/09/2002		10/08/2002		10/01/2002		09/25/2002		10/09/2002	
	SDGNumber	68128		68128		67242		67242		68128	
Parameter	Units										
Aluminum	mg/kg										
Antimony	mg/kg	0.837	J							0.529	UJ
Antimony, SPLP	mg/L					0.048	U				
Arsenic	mg/kg										
Arsenic, TCLP	mg/L										
Barium	mg/kg										
Barium, TCLP	mg/L										
Beryllium	mg/kg										
Cadmium	mg/kg										
Cadmium, TCLP	mg/L										
Calcium	mg/kg										
Chromium, Total	mg/kg										
Chromium, TCLP	mg/L										
Cobalt	mg/kg										
Copper	mg/kg										
Iron	mg/kg										
Lead	mg/kg	365	=							75.6	=
Lead, SPLP	mg/L					0.012	U				
Lead, TCLP	mg/L										
Magnesium	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg										
Potassium	mg/kg										
Selenium	mg/kg										
Selenium, TCLP	mg/L										
Silver	mg/kg										
Silver, TCLP	mg/L										
Sodium	mg/kg										
Thallium	mg/kg	0.595	U							0.55	U
Thallium, SPLP	mg/L					0.05	U				
Vanadium	mg/kg										
Zinc	mg/kg										
Mercury	mg/kg			0.189	J						
Mercury, SPLP	mg/L							0.0004	UJ		
Mercury, TCLP	mg/L										

	StationID	E054SB050		E054SB050		E054SB050		E054SB050		E054SB050	
	SampleID	054SB05001 (0-1ft)		054SB05002 (3-5ft)		054SB05002 (3-5ft)		054SB05002 (3-5ft)		054SB05002 (3-5ft)	
	DateCollected	09/16/2002		09/16/2002		09/16/2002		09/16/2002		09/16/2002	
	DateExtracted	10/07/2002		09/20/2002		09/24/2002		10/07/2002		10/07/2002	
	DateAnalyzed	10/08/2002		10/01/2002		09/25/2002		10/09/2002		10/08/2002	
	SDGNumber	68128		67242		67242		68128		68128	
Parameter	**Units**										
Aluminum	mg/kg										
Antimony	mg/kg							0.579	UJ		
Antimony, SPLP	mg/L			0.048	U						
Arsenic	mg/kg										
Arsenic, TCLP	mg/L										
Barium	mg/kg										
Barium, TCLP	mg/L										
Beryllium	mg/kg										
Cadmium	mg/kg										
Cadmium, TCLP	mg/L										
Calcium	mg/kg										
Chromium, Total	mg/kg										
Chromium, TCLP	mg/L										
Cobalt	mg/kg										
Copper	mg/kg										
Iron	mg/kg										
Lead	mg/kg							5.15	=		
Lead, SPLP	mg/L			0.012	U						
Lead, TCLP	mg/L										
Magnesium	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg										
Potassium	mg/kg										
Selenium	mg/kg										
Selenium, TCLP	mg/L										
Silver	mg/kg										
Silver, TCLP	mg/L										
Sodium	mg/kg										
Thallium	mg/kg							0.603	U		
Thallium, SPLP	mg/L			0.05	U						
Vanadium	mg/kg										
Zinc	mg/kg										
Mercury	mg/kg	0.174	J							0.02	U
Mercury, SPLP	mg/L					0.0004	UJ				
Mercury, TCLP	mg/L										

	StationID	E054SB051		E054SB051		E054SB051		E054SB051		E054SB051	
	SampleID	054SB05101 (0-1ft)		054SB05101 (0-1ft)		054SB05101 (0-1ft)		054SB05101 (0-1ft)		054SB05102 (3-5ft)	
	DateCollected	09/16/2002		09/16/2002		09/16/2002		09/16/2002		09/16/2002	
	DateExtracted	09/20/2002		09/24/2002		10/07/2002		10/07/2002		09/20/2002	
	DateAnalyzed	10/01/2002		09/25/2002		10/09/2002		10/08/2002		10/01/2002	
	SDGNumber	67242		67242		68128		68128		67242	
Parameter	**Units**										
Aluminum	mg/kg										
Antimony	mg/kg					0.58	UJ				
Antimony, SPLP	mg/L	0.048	U							0.048	U
Arsenic	mg/kg										
Arsenic, TCLP	mg/L										
Barium	mg/kg										
Barium, TCLP	mg/L										
Beryllium	mg/kg										
Cadmium	mg/kg										
Cadmium, TCLP	mg/L										
Calcium	mg/kg										
Chromium, Total	mg/kg										
Chromium, TCLP	mg/L										
Cobalt	mg/kg										
Copper	mg/kg										
Iron	mg/kg										
Lead	mg/kg					110	=				
Lead, SPLP	mg/L	0.012	U							0.042	J
Lead, TCLP	mg/L										
Magnesium	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg										
Potassium	mg/kg										
Selenium	mg/kg										
Selenium, TCLP	mg/L										
Silver	mg/kg										
Silver, TCLP	mg/L										
Sodium	mg/kg										
Thallium	mg/kg					0.604	U				
Thallium, SPLP	mg/L	0.05	U							0.05	U
Vanadium	mg/kg										
Zinc	mg/kg										
Mercury	mg/kg							0.369	J		
Mercury, SPLP	mg/L			0.0004	UJ						
Mercury, TCLP	mg/L										

	StationID	E054SB051		E054SB051		E054SB051		E054SB052		E054SB052	
	SampleID	054SB05102 (3-5ft)		054SB05102 (3-5ft)		054SB05102 (3-5ft)		054CB05202 (3-5ft)		054SB05201 (0-1ft)	
	DateCollected	09/16/2002		09/16/2002		09/16/2002		12/20/2002		09/17/2002	
	DateExtracted	09/24/2002		10/07/2002		10/07/2002		12/27/2002		09/24/2002	
	DateAnalyzed	09/25/2002		10/09/2002		10/08/2002		12/30/2002		09/25/2002	
	SDGNumber	67242		68128		68128		72560		67238	
Parameter	Units										
Aluminum	mg/kg										
Antimony	mg/kg			0.547	UJ			8.71	J		
Antimony, SPLP	mg/L										
Arsenic	mg/kg										
Arsenic, TCLP	mg/L										
Barium	mg/kg										
Barium, TCLP	mg/L										
Beryllium	mg/kg										
Cadmium	mg/kg										
Cadmium, TCLP	mg/L										
Calcium	mg/kg										
Chromium, Total	mg/kg										
Chromium, TCLP	mg/L										
Cobalt	mg/kg										
Copper	mg/kg										
Iron	mg/kg										
Lead	mg/kg			8.77	=			225	=		
Lead, SPLP	mg/L										
Lead, TCLP	mg/L										
Magnesium	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg										
Potassium	mg/kg										
Selenium	mg/kg										
Selenium, TCLP	mg/L										
Silver	mg/kg										
Silver, TCLP	mg/L										
Sodium	mg/kg										
Thallium	mg/kg			0.569	U						
Thallium, SPLP	mg/L										
Vanadium	mg/kg										
Zinc	mg/kg										
Mercury	mg/kg					0.024	U			0.236	=
Mercury, SPLP	mg/L	0.0004	UJ								
Mercury, TCLP	mg/L										

	StationID	E054SB052		E054SB052		E054VA001		E054VA001		E054VA001	
	SampleID	054SB05201 (0-1ft)		054SB05202 (3-5ft)		054VA001M3 (-ft)		054VA001M3 (-ft)		054VA001N2 (-ft)	
	DateCollected	09/17/2002		12/20/2002		12/20/2002		12/20/2002		02/13/2003	
	DateExtracted	09/24/2002		12/27/2002		12/28/2002		12/31/2002		02/17/2003	
	DateAnalyzed	09/30/2002		12/30/2002		12/30/2002		01/02/2003		02/18/2003	
	SDGNumber	67238		72560		72560		72560		75039	
Parameter	**Units**										
Aluminum	mg/kg	3560	=								
Antimony	mg/kg	5.35	J	0.765	UJ						
Antimony, SPLP	mg/L										
Arsenic	mg/kg	3.9	=								
Arsenic, TCLP	mg/L					0.029	U			0.041	U
Barium	mg/kg	32.9	J								
Barium, TCLP	mg/L					0.393	J			0.637	J
Beryllium	mg/kg	0.189	J								
Cadmium	mg/kg	2.01	=								
Cadmium, TCLP	mg/L					0.016	J			0.009	J
Calcium	mg/kg	4780	=								
Chromium, Total	mg/kg	123	=								
Chromium, TCLP	mg/L					0.041	J			0.017	J
Cobalt	mg/kg	1.98	J								
Copper	mg/kg	226	J								
Iron	mg/kg	10300	J								
Lead	mg/kg	1230	J	231	=						
Lead, SPLP	mg/L										
Lead, TCLP	mg/L					11.1	J			0.417	J
Magnesium	mg/kg	290	J								
Manganese	mg/kg	93	J								
Nickel	mg/kg	23	=								
Potassium	mg/kg	237	J								
Selenium	mg/kg	0.695	J								
Selenium, TCLP	mg/L					0.037	U			0.042	U
Silver	mg/kg	0.155	U								
Silver, TCLP	mg/L					0.012	U			0.025	U
Sodium	mg/kg	34.3	J								
Thallium	mg/kg	0.492	U								
Thallium, SPLP	mg/L										
Vanadium	mg/kg	9.52	J								
Zinc	mg/kg	1100	=								
Mercury	mg/kg										
Mercury, SPLP	mg/L										
Mercury, TCLP	mg/L							0.0004	UJ		

	StationID	E054VA001	
	SampleID	054VA001N2 (-ft)	
	DateCollected	02/13/2003	
	DateExtracted	02/18/2003	
	DateAnalyzed	02/19/2003	
	SDGNumber	75039	
Parameter	**Units**		
Aluminum	mg/kg		
Antimony	mg/kg		
Antimony, SPLP	mg/L		
Arsenic	mg/kg		
Arsenic, TCLP	mg/L		
Barium	mg/kg		
Barium, TCLP	mg/L		
Beryllium	mg/kg		
Cadmium	mg/kg		
Cadmium, TCLP	mg/L		
Calcium	mg/kg		
Chromium, Total	mg/kg		
Chromium, TCLP	mg/L		
Cobalt	mg/kg		
Copper	mg/kg		
Iron	mg/kg		
Lead	mg/kg		
Lead, SPLP	mg/L		
Lead, TCLP	mg/L		
Magnesium	mg/kg		
Manganese	mg/kg		
Nickel	mg/kg		
Potassium	mg/kg		
Selenium	mg/kg		
Selenium, TCLP	mg/L		
Silver	mg/kg		
Silver, TCLP	mg/L		
Sodium	mg/kg		
Thallium	mg/kg		
Thallium, SPLP	mg/L		
Vanadium	mg/kg		
Zinc	mg/kg		
Mercury	mg/kg		
Mercury, SPLP	mg/L		
Mercury, TCLP	mg/L	0.001	UJ

	StationID	E021GW004		E021GW01R	
	SampleID	021GW004M3		021GW01RM3	
	DateCollected	12/20/2002		12/20/2002	
	DateExtracted	12/23/2002		12/23/2002	
	DateAnalyzed	12/27/2002		12/27/2002	
	SDGNumber	72562		72562	
Parameter	**Units**				
Naphthalene	ug/L	0.6	J	0.99	U
Acenaphthylene	ug/L	1	U	0.99	U
Acenaphthene	ug/L	24.3	=	0.99	U
Fluorene	ug/L	9.1	=	0.99	U
Phenanthrene	ug/L	0.75	J	0.99	U
Anthracene	ug/L	0.58	J	0.99	U
Fluoranthene	ug/L	1.9	=	0.99	U
Pyrene	ug/L	1.2	J	0.99	U
Benzo(a)Anthracene	ug/L	1	U	0.99	U
Chrysene	ug/L	1	U	0.99	U
Benzo(b)Fluoranthene	ug/L	1	U	0.99	U
Benzo(k)Fluoranthene	ug/L	1	U	0.99	U
Benzo(a)Pyrene	ug/L	1	U	0.99	U
Indeno(1,2,3-c,d)pyrene	ug/L	1	UJ	0.99	UJ
Dibenz(a,h)anthracene	ug/L	1	U	0.99	U
Benzo(g,h,i)Perylene	ug/L	1	UJ	0.99	UJ

	StationID	E021GW002		E021GW002		E021GW004		E021GW004	
	SampleID	021GW002RM2		021GW002RM2		021GW004M2		021GW004M2	
	DateCollected	09/30/2002		09/30/2002		10/01/2002		10/01/2002	
	DateExtracted	10/03/2002		10/04/2002		10/03/2002		10/04/2002	
	DateAnalyzed	10/04/2002		10/07/2002		10/04/2002		10/07/2002	
	SDGNumber	68003		68003		68003		68003	
Parameter	Units								
Aluminum	ug/L			386	=			31.3	U
Antimony	ug/L			4.79	U			4.79	U
Arsenic	ug/L			35.6	=			20.8	=
Barium	ug/L			55.2	J			791	=
Beryllium	ug/L			0.185	U			0.185	U
Cadmium	ug/L			0.288	U			0.21	U
Calcium	ug/L			49600	=			107000	=
Chromium, Total	ug/L			1.65	U			0.532	U
Cobalt	ug/L			0.581	U			0.581	U
Copper	ug/L			1.86	U			1.41	U
Iron	ug/L			7560	=			15200	=
Lead	ug/L			3.97	U			2.49	U
Magnesium	ug/L			10300	=			17200	=
Manganese	ug/L			156	=			365	=
Nickel	ug/L			2.29	U			0.837	U
Potassium	ug/L			15900	=			12300	=
Selenium	ug/L			2.67	U			2.85	U
Silver	ug/L			1.15	U			1.15	U
Sodium	ug/L			279000	=			34500	=
Thallium	ug/L			4.99	U			4.99	U
Vanadium	ug/L			1.31	J			0.793	U
Zinc	ug/L			23.5	=			10.8	U
Mercury	ug/L	0.064	U			0.179	J		

	StationID	E021GW004		E021GW004		E021GW01R		E021GW01R	
	SampleID	021HW004M2		021HW004M2		021GW01RM2		021GW01RM2	
	DateCollected	10/01/2002		10/01/2002		09/03/2002		09/03/2002	
	DateExtracted	10/03/2002		10/04/2002		10/03/2002		10/04/2002	
	DateAnalyzed	10/04/2002		10/07/2002		10/04/2002		10/07/2002	
	SDGNumber	68003		68003		68003		68003	
Parameter	**Units**								
Aluminum	ug/L			59.5	U			228	U
Antimony	ug/L			4.79	U			4.79	U
Arsenic	ug/L			19.3	=			3.97	U
Barium	ug/L			769	=			532	=
Beryllium	ug/L			0.185	U			0.185	U
Cadmium	ug/L			0.343	U			0.522	U
Calcium	ug/L			105000	=			484000	=
Chromium, Total	ug/L			0.532	U			0.692	U
Cobalt	ug/L			0.581	U			0.581	U
Copper	ug/L			1.64	U			4.1	U
Iron	ug/L			14600	=			9610	=
Lead	ug/L			4.5	U			12.8	=
Magnesium	ug/L			16900	=			174000	=
Manganese	ug/L			357	=			1920	=
Nickel	ug/L			1.02	U			0.837	U
Potassium	ug/L			12200	=			50400	J
Selenium	ug/L			3.82	U			2.67	U
Silver	ug/L			1.15	U			1.15	U
Sodium	ug/L			33300	=			2280000	=
Thallium	ug/L			4.99	U			14.3	=
Vanadium	ug/L			0.793	U			1.11	J
Zinc	ug/L			46.1	=			26	=
Mercury	ug/L	0.381	=			0.064	U		

	StationID	E054GW002		E054GW002	
	SampleID	054GW002M2		054GW002M2	
	DateCollected	09/30/2002		09/30/2002	
	DateExtracted	10/03/2002		10/04/2002	
	DateAnalyzed	10/04/2002		10/07/2002	
	SDGNumber	68003		68003	
Parameter	**Units**				
Aluminum	ug/L			26	U
Antimony	ug/L			24.9	J
Arsenic	ug/L			3.97	U
Barium	ug/L			73.8	J
Beryllium	ug/L			0.185	U
Cadmium	ug/L			0.795	U
Calcium	ug/L			130000	=
Chromium, Total	ug/L			1.56	U
Cobalt	ug/L			0.581	U
Copper	ug/L			21.7	U
Iron	ug/L			8060	=
Lead	ug/L			258	=
Magnesium	ug/L			155000	=
Manganese	ug/L			140	=
Nickel	ug/L			12.3	J
Potassium	ug/L			55200	J
Selenium	ug/L			2.67	U
Silver	ug/L			1.15	U
Sodium	ug/L			1400000	=
Thallium	ug/L			4.99	U
Vanadium	ug/L			1.13	J
Zinc	ug/L			103	=
Mercury	ug/L	0.064	U		

	StationID	E021GW002		E021GW002		E021GW004		E021GW004	
	SampleID	021GW002RM2		021GW002RM2		021GW004M2		021GW004M2	
	DateCollected	09/30/2002		09/30/2002		10/01/2002		10/01/2002	
	DateExtracted	10/03/2002		10/04/2002		10/03/2002		10/04/2002	
	DateAnalyzed	10/04/2002		10/07/2002		10/04/2002		10/07/2002	
	SDGNumber	68005		68005		68005		68005	
Parameter	Units								
Aluminum, Dissolved	ug/L			12.8	U			6.19	U
Antimony, Dissolved	ug/L			4.79	U			4.79	U
Arsenic, Dissolved	ug/L			14.2	=			7.14	J
Barium, Dissolved	ug/L			34.9	J			666	=
Beryllium, Dissolved	ug/L			0.185	U			0.185	U
Cadmium, Dissolved	ug/L			0.21	U			0.21	U
Calcium, Dissolved	ug/L			48400	=			104000	=
Chromium, Dissolved	ug/L			0.61	U			0.532	U
Cobalt, Dissolved	ug/L			0.581	U			0.581	U
Copper, Dissolved	ug/L			1.3	U			1.3	U
Iron, Dissolved	ug/L			107	=			1860	=
Lead, Dissolved	ug/L			1.46	U			2.15	U
Magnesium, Dissolved	ug/L			9920	=			17300	=
Manganese, Dissolved	ug/L			143	=			345	=
Mercury, Dissolved	ug/L	0.064	U			0.064	U		
Nickel, Dissolved	ug/L			2.69	U			0.872	U
Potassium, Dissolved	ug/L			15500	=			12400	=
Selenium, Dissolved	ug/L			2.67	U			2.67	U
Silver, Dissolved	ug/L			1.15	U			1.15	U
Sodium, Dissolved	ug/L			295000	=			35200	=
Thallium, Dissolved	ug/L			4.99	U			4.99	U
Vanadium, Dissolved	ug/L			0.793	U			0.793	U
Zinc, Dissolved	ug/L			12.1	U			1.77	U

	StationID	E021GW004		E021GW004		E021GW01R		E021GW01R	
	SampleID	021HW004M2		021HW004M2		021GW01RM2		021GW01RM2	
	DateCollected	10/01/2002		10/01/2002		09/03/2002		09/03/2002	
	DateExtracted	10/03/2002		10/04/2002		10/03/2002		10/04/2002	
	DateAnalyzed	10/04/2002		10/07/2002		10/04/2002		10/07/2002	
	SDGNumber	68005		68005		68005		68005	
Parameter	**Units**								
Aluminum, Dissolved	ug/L			6.19	U			16.4	U
Antimony, Dissolved	ug/L			4.79	U			4.79	U
Arsenic, Dissolved	ug/L			4.19	J			3.97	U
Barium, Dissolved	ug/L			571	=			522	=
Beryllium, Dissolved	ug/L			0.185	U			0.185	U
Cadmium, Dissolved	ug/L			0.21	U			0.253	U
Calcium, Dissolved	ug/L			107000	=			490000	=
Chromium, Dissolved	ug/L			0.532	U			0.532	U
Cobalt, Dissolved	ug/L			0.581	U			0.581	U
Copper, Dissolved	ug/L			1.54	U			1.3	U
Iron, Dissolved	ug/L			1660	=			13.6	U
Lead, Dissolved	ug/L			1.65	U			3.99	U
Magnesium, Dissolved	ug/L			15900	=			180000	=
Manganese, Dissolved	ug/L			376	=			2020	=
Mercury, Dissolved	ug/L	0.064	U			0.064	U		
Nickel, Dissolved	ug/L			0.837	U			0.837	U
Potassium, Dissolved	ug/L			11600	=			52700	J
Selenium, Dissolved	ug/L			2.67	U			2.67	U
Silver, Dissolved	ug/L			1.15	U			1.15	U
Sodium, Dissolved	ug/L			29500	=			2400000	=
Thallium, Dissolved	ug/L			5.79	J			15.7	=
Vanadium, Dissolved	ug/L			0.793	U			0.793	U
Zinc, Dissolved	ug/L			3.63	U			4.26	U

	StationID	E054GW002		E054GW002	
	SampleID	054GW002M2		054GW002M2	
	DateCollected	09/30/2002		09/30/2002	
	DateExtracted	10/03/2002		10/04/2002	
	DateAnalyzed	10/04/2002		10/07/2002	
	SDGNumber	68005		68005	
Parameter	Units				
Aluminum, Dissolved	ug/L			6.19	U
Antimony, Dissolved	ug/L			18.1	J
Arsenic, Dissolved	ug/L			3.97	U
Barium, Dissolved	ug/L			68.4	J
Beryllium, Dissolved	ug/L			0.185	U
Cadmium, Dissolved	ug/L			0.536	U
Calcium, Dissolved	ug/L			129000	=
Chromium, Dissolved	ug/L			0.532	U
Cobalt, Dissolved	ug/L			0.581	U
Copper, Dissolved	ug/L			3.03	U
Iron, Dissolved	ug/L			353	=
Lead, Dissolved	ug/L			1.49	U
Magnesium, Dissolved	ug/L			151000	=
Manganese, Dissolved	ug/L			136	=
Mercury, Dissolved	ug/L	0.064	U		
Nickel, Dissolved	ug/L			10.9	J
Potassium, Dissolved	ug/L			59400	J
Selenium, Dissolved	ug/L			2.67	U
Silver, Dissolved	ug/L			1.15	U
Sodium, Dissolved	ug/L			1530000	=
Thallium, Dissolved	ug/L			4.99	U
Vanadium, Dissolved	ug/L			0.793	U
Zinc, Dissolved	ug/L			74.7	=

Appendix C

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

Code	Definition
2S	Second Source
2C	Second Column Confirmation
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
TD	Total vs Dissolved
TN	Tune

Table 1 - Chemical Analytical Methods – Field and Quality Control Samples – Organic Analyses

TABLE 1
Chemical Analytical Methods – Field and Quality Control Samples – Organic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67237	E054SB047	054SB04701	67237001	SO	N		0	1	09/17/02	X	X
67237	E054SB052	054SB05201	67237002	SO	N		0	1	09/17/02	X	X
67237	E054SB041	054SB04101	67237003	SO	N		0	1	09/17/02	X	X
67237	E054SB042	054SB04201	67237004	SO	N		0	1	09/17/02	X	X
67237	E054SB043	054SB04301	67237005	SO	N		0	1	09/17/02	X	X
67237	E054SB043	054CB04301	67237006	SO	FD		0	1	09/17/02	X	X
67237	E054SB044	054SB04401	67237007	SO	N		0	1	09/17/02	X	X
67237	E054SB045	054SB04501	67237008	SO	N		0	1	09/17/02	X	X
67237	E054SB046	054SB04601	67237009	SO	N		0	1	09/17/02	X	X
67237	LABQC	1200301411	1200301411	SQ	LB						X
67237	LABQC	1200301412	1200301412	SQ	BS						X
67237	LABQC	1200303219	1200303219	SQ	LB					X	
67237	LABQC	1200303220	1200303220	SQ	BS					X	
67237	E054SB047	054SB04701MS	1200303221	SO	MS		0	1	09/17/02	X	
67237	E054SB047	054SB04701SD	1200303222	SO	SD		0	1	09/17/02	X	
67237	LABQC	1200303512	1200303512	SQ	LB						X

TABLE 1
Chemical Analytical Methods – Field and Quality Control Samples – Organic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

67237	LABQC	1200303513	1200303513	SQ	BS						X
67239	FIELDQC	054EB040M1	67239001	WQ	EB				09/17/02	X	X
67239	FIELDQC	054TB040M1	67239002	WQ	TB				09/17/02	X	
67239	LABQC	1200301424	1200301424	WQ	LB						X
67239	LABQC	1200301425	1200301425	WQ	BS						X
67239	LABQC	1200303685	1200303685	WQ	LB					X	
67239	LABQC	1200303686	1200303686	WQ	BS					X	
72560	E054SB052	054SB05202	72560001	SO	N		3	5	12/20/02		X
72560	E054SB052	054CB05202	72560002	SO	FD		3	5	12/20/02		X
72560	E054SB053	054SB05302	72560003	SO	N		3	5	12/20/02		X
72560	E054SB054	054SB05402	72560004	SO	N		3	5	12/20/02		X
72560	E054SB055	054SB05503	72560005	SO	N		1	2	12/20/02		X
72560	E054SB056	054SB05601	72560006	SO	N		0	1	12/20/02		X
72560	E054SB057	054SB05701	72560007	SO	N		0	1	12/20/02		X
72560	E054SB057	054SB05701DL	72560007	SO	LR	DL	0	1	12/20/02		X
72560	E054SB058	054SB05801	72560008	SO	N		0	1	12/20/02		X
72560	E054SB059	054SB05901	72560009	SO	N		0	1	12/20/02		X
72560	LABQC	1200356180	1200356180	SQ	LB						X
72560	LABQC	1200356181	1200356181	SQ	BS						X

TABLE 1
Chemical Analytical Methods – Field and Quality Control Samples – Organic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

Site	Sample ID	Sample ID	Lab Sample ID	Matrix	Sample Type	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
72562	E021GW01R	021GW01RM3	72562003	WG	N				12/20/02		X
72562	E021GW004	021GW004M3	72562004	WG	N				12/20/02		X
72562	LABQC	1200356536	1200356536	WQ	LB						X
72562	LABQC	1200356537	1200356537	WQ	BS						X
72562	E021GW004	021GW004M3MS	1200356538	WG	MS				12/20/02		X
72562	E021GW004	021GW004M3SD	1200356539	WG	SD				12/20/02		X
72562	FIELDQC	054EB052M3	72562001	WQ	EB				12/20/02		X
72562	FIELDQC	021EW001M3	72562002	WQ	EB				12/20/02		X
73864	E054SB060	054SB06001	73864001	SO	N		0	1	01/23/03		X
73864	E054SB061	054SB06101	73864002	SO	N		0	1	01/23/03		X
73864	LABQC	1200368979	1200368979	SQ	LB						X
73864	LABQC	1200368980	1200368980	SQ	BS						X
73870	FIELDQC	054EB060N1	73870001	WQ	EB				01/23/03		X
73870	LABQC	1200369134	1200369134	WQ	LB						X
73870	LABQC	1200369135	1200369135	WQ	BS						X

TABLE 1
Chemical Analytical Methods – Field and Quality Control Samples – Organic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

MATRIX CODE

WG – Groundwater
WQ – Water QC Sample
SO – Soil
SQ – Soil QC Sample

SAMPLE TYPE CODE

BS - Blank Spike
EB - Equipment Blank
TB – Trip Blank
N - Native Sample
FD – Field Duplicate
LB - Laboratory Blank
LR – Laboratory Replicate
MS – Matrix Spike
SD – Matrix Spike Duplicate

LR TYPE

DL - Dilution

ANALYSIS CODE

VOC – Volatile Organic Compounds
SVOC - Semivolatile Organic Compounds

Table 2 - Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses

TABLE 2
Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Matrix	Sample Type	Upper Depth	Lower Depth	Date Collected	Total Metals SW6010	Dissolved Metals SW6010	TCLP Metals SW6010	SPLP Metals SW6010	Total Mercury SW7471	Dissolved Mercury SW7470	TCLP Mercury SW7470	SPLP Mercury SW7470
67238	E054SB047	054SB04701	67238001	SO	N	0	1	09/17/02	X				X			
67238	E054SB052	054SB05201	67238002	SO	N	0	1	09/17/02	X				X			
67238	E054SB041	054SB04101	67238003	SO	N	0	1	09/17/02	X				X			
67238	E054SB042	054SB04201	67238004	SO	N	0	1	09/17/02	X				X			
67238	E054SB043	054SB04301	67238005	SO	N	0	1	09/17/02	X				X			
67238	E054SB043	054CB04301	67238006	SO	FD	0	1	09/17/02	X				X			
67238	E054SB044	054SB04401	67238007	SO	N	0	1	09/17/02	X				X			
67238	E054SB045	054SB04501	67238008	SO	N	0	1	09/17/02	X				X			
67238	E054SB046	054SB04601	67238009	SO	N	0	1	09/17/02	X				X			
67238	LABQC	1200301632	1200301632	SQ	LB				X							
67238	E054SB047	054SB04701MS	1200301634	SO	MS	0	1	09/17/02	X							
67238	LABQC	1200301636	1200301636	SQ	BS				X							
67238	E054SB047	054SB04701SD	1200301639	SO	SD	0	1	09/17/02	X							
67238	LABQC	1200303349	1200303349	SQ	LB								X			
67238	E054SB047	054SB04701MS	1200303350	SO	MS	0	1	09/17/02					X			
67238	E054SB047	054SB04701SD	1200303351	SO	SD	0	1	09/17/02					X			

TABLE 2
Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

ISDG	Station ID	Sample ID	Lab Sample ID	Matrix	Sample Type	Upper Depth	Lower Depth	Date Collected	Total Metals SW6010	Dissolved Metals SW6010	Leach Metals SW6010	SPLP Metals SW6010	Total Mercury SW7470	Dissolved Mercury SW7470	Leach Mercury SW7470	SPLP Mercury SW7470
67238	LABQC	1200303352	1200303352	SQ	BS								X			
67241	FIELDQC	054EB040M1	67241001	WQ	EB			09/17/02	X				X			
67241	LABQC	1200302483	1200302483	WQ	LB				X							
67241	LABQC	1200302487	1200302487	WQ	BS				X							
67241	LABQC	1200303329	1200303329	WQ	LB								X			
67241	LABQC	1200303332	1200303332	WQ	BS								X			
67242	E054SB048	054SB04801	67242001	SO	N	0	1	09/16/02				X				X
67242	E054SB048	054SB04802	67242002	SO	N	3	5	09/16/02				X				X
67242	E054SB049	054SB04901	67242003	SO	N	0	1	09/16/02				X				X
67242	E054SB049	054SB04902	67242004	SO	N	3	5	09/16/02				X				X
67242	E054SB050	054SB05001	67242005	SO	N	0	1	09/16/02				X				X
67242	E054SB050	054SB05002	67242006	SO	N	3	5	09/16/02				X				X
67242	E054SB051	054SB05101	67242007	SO	N	0	1	09/16/02				X				X
67242	E054SB051	054SB05102	67242008	SO	N	3	5	09/16/02				X				X
67242	E054SB048	054SB04801MS	1200301454	SO	MS	0	1	09/16/02				X				
67242	E054SB048	054SB04801MS	1200301455	SO	MS	0	1	09/16/02								X
67242	E054SB048	054SB04801SD	1200301456	SO	SD	0	1	09/16/02				X				
67242	E054SB048	054SB04801SD	1200301457	SO	SD	0	1	09/16/02								X
67242	LABQC	1200301458	1200301458	SQ	LB							X				X

TABLE 2
Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Matrix	Sample Type	Upper Depth	Lower Depth	Date Collected	Total Metals SW6010	Dissolved Metals SW6010	Total Metals SW6010	Total Metals SW6010	Total Mercury SW7470	Dissolved Mercury SW7470	Total Mercury SW7470	Total Mercury SW7470
67242	LABQC	1200303579	1200303579	SQ	LB				X							
67242	LABQC	1200303581	1200303581	SQ	BS				X							
67242	LABQC	1200303585	1200303585	SQ	LB								X			
67242	LABQC	1200303588	1200303588	SQ	BS								X			
68003	E021GW01R	021GW01RM2	68003001	WG	N			09/03/02	X				X			
68003	E021GW002	021GW002RM2	68003002	WG	N			09/30/02	X				X			
68003	E054GW002	054GW002M2	68003003	WG	N			09/30/02	X				X			
68003	E021GW004	021GW004M2	68003004	WG	N			10/01/02	X				X			
68003	E021GW004	021HW004M2	68003005	WG	FD			10/01/02	X				X			
68003	FIELDQC	054EW002M2	68003006	WQ	EB			09/30/02	X				X			
68003	LABQC	1200309604	1200309604	WQ	LB				X							
68003	E021GW01R	021GW01RM2MS	1200309606	WG	MS			09/03/02	X							
68003	E021GW01R	021GW01RM2SD	1200309607	WG	SD			09/03/02	X							
68003	LABQC	1200309608	1200309608	WQ	BS				X							
68003	LABQC	1200309909	1200309909	WQ	LB								X			
68003	E021GW01R	021GW01RM2MS	1200309910	WG	MS			09/03/02					X			
68003	E021GW01R	021GW01RM2SD	1200309911	WG	SD			09/03/02					X			
68003	LABQC	1200309912	1200309912	WQ	BS								X			
68005	E021GW01R	021GW01RM2	68005001	WG	N			09/03/02		X				X		

TABLE 2
Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Matrix	Sample Type	Upper Depth	Lower Depth	Date Collected	Total Metals SW6010	Dissolved Metals SW6010	Total Metals SW6010	Dissolved Metals SW6010	Total Mercury SW7470	Dissolved Mercury SW7470	Total Mercury SW7470	Dissolved Mercury SW7470
68005	E021GW002	021GW002RM2	68005002	WG	N			09/30/02		X				X		
68005	E054GW002	054GW002M2	68005003	WG	N			09/30/02		X				X		
68005	E021GW004	021GW004M2	68005004	WG	N			10/01/02		X				X		
68005	E021GW004	021HW004M2	68005005	WG	FD			10/01/02		X				X		
68005	FIELDQC	054EW002M2	68005006	WQ	EB			09/30/02		X				X		
68005	LABQC	1200309604	1200309604	WQ	LB				X							
68005	LABQC	1200309608	1200309608	WQ	BS				X							
68005	LABQC	1200309909	1200309909	WQ	LB								X			
68005	LABQC	1200309912	1200309912	WQ	BS								X			
68128	E054SB048	054SB04801	68128001	SO	N	0	1	09/16/02	X				X			
68128	E054SB048	054SB04802	68128002	SO	N	3	5	09/16/02	X				X			
68128	E054SB049	054SB04901	68128003	SO	N	0	1	09/16/02	X				X			
68128	E054SB049	054SB04902	68128004	SO	N	3	5	09/16/02	X				X			
68128	E054SB050	054SB05001	68128005	SO	N	0	1	09/16/02	X				X			
68128	E054SB050	054SB05002	68128006	SO	N	3	5	09/16/02	X				X			
68128	E054SB051	054SB05101	68128007	SO	N	0	1	09/16/02	X				X			
68128	E054SB051	054SB05102	68128008	SO	N	3	5	09/16/02	X				X			
68128	LABQC	1200310709	1200310709	SQ	LB				X							
68128	E054SB048	054SB04801MS	1200310711	SO	MS	0	1	09/16/02	X							

TABLE 2
Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Matrix	Sample Type	Upper Depth	Lower Depth	Date Collected	Total Metals SW6010	Dissolved Metals SW6010	TCLP Metals SW6010	SPLP Metals SW6010	Total Mercury SW7470	Dissolved Mercury SW7470	TCLP Mercury SW7470	SPLP Mercury SW7470
68128	E054SB048	054SB04801SD	1200310712	SO	SD	0	1	09/16/02	X							
68128	LABQC	1200310713	1200310713	SQ	BS				X							
68128	LABQC	1200312329	1200312329	SQ	LB								X			
68128	E054SB048	054SB04801MS	1200312330	SO	MS	0	1	09/16/02					X			
68128	E054SB048	054SB04801SD	1200312331	SO	SD	0	1	09/16/02					X			
68128	LABQC	1200312332	1200312332	SQ	BS								X			
72560	E054SB052	054SB05202	72560001	SO	N	3	5	12/20/02	X							
72560	E054SB052	054CB05202	72560002	SO	FD	3	5	12/20/02	X							
72560	E054VA001	054VA001M3	72560010	SO	N			12/20/02			X				X	
72560	LABQC	1200357085	1200357085	SQ	LB				X							
72560	LABQC	1200357086	1200357086	SQ	BS				X							
72560	E054SB052	054SB05202MS	1200357087	SO	MS	3	5	12/20/02	X							
72560	E054SB052	054SB05202SD	1200357088	SO	SD	3	5	12/20/02	X							
72560	E054VA001	054VA001M3MS	1200357458	SO	MS			12/20/02			X					
72560	E054VA001	054VA001M3MS	1200357459	SO	MS			12/20/02							X	
72560	E054VA001	054VA001M3SD	1200357460	SO	SD			12/20/02			X					
72560	E054VA001	054VA001M3SD	1200357461	SO	SD			12/20/02							X	
72560	LABQC	1200357462	1200357462	SQ	LB						X				X	
72560	LABQC	1200358393	1200358393	WQ	LB				X							

TABLE 2
Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

SDG	Station ID	Sample ID	Lab Sample ID	Matrix	Sample Type	Upper Depth	Lower Depth	Date Collected	Total Metals SW6010	Dissolved Metals SW6010	TCLP Metals SW6010	SPLP Metals SW6010	Total Mercury SW7471	Dissolved Mercury SW7470	TCLP Mercury SW7470	SPLP Mercury SW7470
72560	LABQC	1200358394	1200358394	WQ	BS				X							
72560	LABQC	1200358565	1200358565	WQ	LB								X			
72560	LABQC	1200358566	1200358566	WQ	BS								X			
72562	LABQC	1200357784	1200357784	WQ	LB				X							
72562	LABQC	1200357785	1200357785	WQ	BS				X							
72562	FIELDQC	054EB052M3	72562001	WQ	EB			12/20/02	X							
75039	E054VA001	054VA001N2	75039001	SO	N			02/13/03			X				X	
75039	E054VA001	054VA001N2MS	1200380746	SO	MS			02/13/03			X					
75039	E054VA001	054VA001N2MS	1200380747	SO	MS			02/13/03							X	
75039	E054VA001	054VA001N2SD	1200380748	SO	SD			02/13/03			X					
75039	E054VA001	054VA001N2SD	1200380749	SO	SD			02/13/03							X	
75039	LABQC	1200380750	1200380750	SO	LB						X				X	
75039	LABQC	1200381294	1200381294	WQ	LB				X							
75039	LABQC	1200381295	1200381295	WQ	BS				X							
75039	LABQC	1200381721	1200381721	WQ	LB								X			
75039	LABQC	1200381722	1200381722	WQ	BS								X			

TABLE 2
Chemical Analytical Methods – Field and Quality Control Samples – Inorganic Analyses
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

Site	Station ID	Sample ID	Lab Sample ID	Matrix	Sample Type	Upper Depth	Lower Depth	Date Collected	Total Metals SW6010	Dissolved Metals SW6010	TCLP Metals SW6010	SPLP Metals SW6010	Total Mercury SW7470	Dissolved Mercury SW7470	TCLP Mercury SW7470	SPLP Mercury SW7470

MATRIX CODE

WG – Groundwater
WQ – Water QC Sample
SO – Soil
SQ – Soil QC Sample

SAMPLE TYPE CODE

BS - Blank Spike
EB - Equipment Blank
N - Native Sample
FD – Field Duplicate
LB - Laboratory Blank
MS – Matrix Spike
SD – Matrix Spike Duplicate

ANALYSIS CODE

TCLP – Toxicity Characteristic Leaching Procedure
SPLP – Synthetic Precipitation Leaching Procedure

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.
- **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.
- **Field Duplicate Samples** – These samples are collected to determine precision between a native and its duplicate. This information can only be determined when target compounds are detected.
- **GC/MS Tuning** – The mass spectrum of the tuning compound is evaluated for method compliance. The criteria are established to verify the proper mass assignment and mass resolution.
- **Initial Calibration** – The initial calibration ensures that the instrument is capable of producing acceptable qualitative and quantitative data for the compounds of interest.
- **Continuing Calibration** – The continuing calibration checks satisfactory performance of the instrument and its predicted response to the target compounds.
- **Internal Standards** – The internal standards (retention time and response) are evaluated for method compliance. The internal standards are used in quantitation of the target parameters and monitor the instrument sensitivity and response for stability during each analysis.
- **Confirmation** – If GCMS methodology is not initially used for analysis, SW-846 method 8000 requires confirmation when the composition of samples is not well characterized. Therefore, even when the identification has been confirmed on a dissimilar column or detector, the agreement of the quantitative results on both columns is evaluated. For

Pesticide and PCB analyses covered in this report, confirmation was performed using a dissimilar analytical column. The laboratory analyzed samples with a gas chromatograph (GC) utilizing simultaneous primary and confirmation data acquisition. Per SW-86 method 8000, 40% RPD criteria was used as the acceptance limit.

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 3.

TABLE 3
Blank Contamination: VOC
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67237	054EB040M1	67239001	EB	Toluene	0.59	µg/L	3.0 µg/Kg
67237	054EB040M1	67239002	EB	1,4-Dichlorobenzene	0.25	µg/L	1.3 µg/Kg
67239	1200303685	1200303685	LB	1,4-Dichlorobenzene	0.47	µg/L	2.4 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

All Surrogate, Matrix Spike (MS), Matrix Spike Duplicate (MSD), and Laboratory Control Sample (LCS) recoveries were within acceptable quality control limits, except as noted in Table 4 below.

TABLE 4
Surrogate, MS/MSD, and LCS Recoveries Out of QC Limits: VOC
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

67237	67237001 MS/MSD	2-Chloroethyl vinyl ether	52* / 60*	70-130	67237001	Detects-J, non-detects-UJ
		1,2,4-Trichlorobenzene	53* / 62*			
		1,2,3-Trichlorobenzene	52* / 62*			
67237	1200303220 LCS	2-Chloroethyl vinyl ether	42*	70-130	67237 – All	Detects-J, non-detects-UJ
67239	1200303686 LCS	Vinyl acetate	67.2*	70-130	67239 – All	No flags applied (EB & TB only)
67239	67239001	Dibromofluoromethane	125*	80-120	67239001	No flags applied (EB only)
		Toluene-d8	114*	88-110		
		Bromofluorobenzene	126*	86-115		
67239	67239002	Dibromofluoromethane	124*	80-120	67239002	No flags applied (TB only)
		Toluene-d8	114*	88-110		
		Bromofluorobenzene	125*	86-115		

* - out of control limits

Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as listed in Table 5.

TABLE 5
Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: VOC
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

VOA1-ICAL-09/04/02, 2300	1,2,4-Trichlorobenzene	$R^2 = 0.989$	67237 – All
	1,2,3-Trichlorobenzene	$R^2 = 0.986$	
VOA1-CCAL-09/20/02, 0805	2-Butanone	22.1% low	67237 – All
	2-Chloroethyl vinyl ether	36.1% low	

TABLE 5
Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: VOC
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]
VOA1-CCAL-09/20/02, 0805	2-Hexanone	21.0% low	67237 – All
	1,2,4-Trichlorobenzene	29.4% low	
	1,2,3-Trichlorobenzene	36.9% low	
VOA2-ICAL-09/20/02, 1553	1,2,3-Trichlorobenzene	$R^2 = 0.981$	67239 – All

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.

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.

Blanks

The SVOC target parameters detected in blank samples are listed in Table 6.

TABLE 6
Blank Contamination: SVOC
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67237	1200303512	1200303512	LB	Benzoic acid	47.6	µg/Kg	238.0 µg/Kg
67237	054EB040M1	67239001	EB	Bis(2-ethylhexyl)phthalate	2.3	µg/L	759.0 µg/Kg
67239	054EB040M1	67239001	EB	Bis(2-ethylhexyl)phthalate	2.3	µg/L	23.0 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.

Field Duplicate Samples

All Field Duplicate Samples were within acceptable quality control limits, except as noted in Table 7 below. No flags are applied due to Field Duplicate precision.

TABLE 7
Field Duplicate RPDs Out of QC Limits: SVOC
Charleston Naval Complex, , Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
72560	054SB005202 / 054CB05202	Benzo(b)fluoranthene	Non-detect	196 ug/Kg	200*	35
* - out of control limits						

Initial and Continuing Calibration Criteria

All initial calibration criteria and continuing calibration criteria were met, except as listed in Table 8.

TABLE 8
Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: SVOC
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]
MSD8-ICAL-09/06/02, 1433	Hexachlorocyclopentadiene	R^2 =0.989	67237001, 67237002, 67237004 – 67237009
MSD4-ICAL-08/28/02, 0034	o-Nitroaniline	R^2 =0.989	67237003
	2,4-Dinitrophenol	R^2 =0.986	
	2-Methyl-4,6-dinitrophenol	R^2 =0.989	
	Pyrene	R^2 =0.982	

TABLE 8
Exceptions to Initial Calibration Criteria and Continuing Calibration Criteria: SVOC
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

MSD4-ICAL-08/28/02, 0034	Di-n-octylphthalate	R^2=0.989	67237003
MSD8-CCAL-09/18/02, 1901	Bis(2-chloroethyl)ether	22.6% low	67237001, 67237002, 67237004 – 67237009
	2,4-Dinitrophenol	25.5% low	
MSD4-CCAL-09/20/02, 1436	Hexachlorocyclopentadiene	23.2% low	67237003
	4-Nitrophenol	20.8% low	
	Carbazole	24.5% low	
MSD2-ICAL-08/09/02, 1910	Naphthalene	R^2=0.985	67239001
	p-Nitroaniline	R^2=0.989	
MSD2-CCAL-09/19/02, 1938	o-Nitroaniline	24.7% high	67239001
	Pyridine	21.0% low	
	m,p-Cresols	20.1% high	
	2,4-Dimethylphenol	20.9% low	
MSD7-CCAL-12/26/02, 0856	Pyrene	32.6% high	72560001 – 72560003, 72560005 – 72560007
	Indeno(1,2,3-cd)pyrene	20.1% low	
	Dibenzo(a,h)anthracene	23.5% low	
	Benzo(ghi)perylene	23.2% low	
MSD2-CCAL-01/26/03, 1949	Pyrene	22.0% high	73864002
MSD5-ICAL-12/20/02, 1408	Indeno(1,2,3-cd)pyrene	R^2=0.981	72562 – All
	Benzo(ghi)perylene	R^2=0.982	
MSD5-CCAL-12/27/02, 0819	Pyrene	27.6% high	72562 – All
	Benzo(b)fluoranthene	26.6% high	

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 high in the continuing calibration standards, detected compounds were flagged "J", as estimated. Non-detected compounds were not flagged.

- 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.

Internal Standard Area

All internal standard areas were within QC limits, except as noted in below.

- The recovery for the internal standard Phenanthrene-d10 in sample 72560004 was below QC limits at 61.0 percent low. Detects for the associated analytes in the sample were flagged 'J', and non-detects were flagged 'UJ'.

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 and Table 10.

TABLE 9
Blank Contamination: Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

67238	CCB		CCB	Aluminum	92.8	µg/L	23.2 mg/Kg
67238	CCB		CCB	Barium	0.725	µg/L	0.181 mg/Kg
67238	CCB		CCB	Beryllium	0.664	µg/L	0.166 mg/Kg
67238	CCB		CCB	Cadmium	0.384	µg/L	0.096 mg/Kg
67238	CCB		CCB	Calcium	80.9	µg/L	20.225 mg/Kg
67238	CCB		CCB	Cobalt	0.999	µg/L	0.250 mg/Kg
67238	CCB		CCB	Iron	58.8	µg/L	14.7 mg/Kg
67238	CCB		CCB	Lead	2.21	µg/L	0.553 mg/Kg
67238	CCB		CCB	Magnesium	92.2	µg/L	23.05 mg/Kg
67238	CCB		CCB	Manganese	0.660	µg/L	0.165 mg/Kg
67238	CCB		CCB	Silver	1.40	µg/L	0.350 mg/Kg
67238	CCB		CCB	Zinc	3.32	µg/L	0.83 mg/Kg
67238	1200301632	1200301632	LB	Chromium	0.066	mg/Kg	0.330 mg/Kg
67238	1200301632	1200301632	LB	Iron	2.61	mg/Kg	13.050 mg/Kg
67238	054EB040M1	67241001	EB	Aluminum**	30.8	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Barium**	18.9	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Beryllium**	0.225	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Cadmium**	0.243	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Calcium**	19.300	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Iron**	4.460	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Magnesium**	2490	µg/L	no flags applied **

TABLE 9
Blank Contamination: Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67238	054EB040M1	67241001	EB	Manganese**	1.240	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Nickel**	11.3	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Potassium**	3090	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Sodium**	25900	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Vanadium**	1.610	µg/L	no flags applied **
67238	054EB040M1	67241001	EB	Zinc**	2.350	µg/L	no flags applied **
68003	CCB		CCB	Aluminum	63.4	µg/L	317.0 µg/L
68003	CCB		CCB	Barium	0.512	µg/L	2.56 µg/L
68003	CCB		CCB	Beryllium	0.317	µg/L	1.58 µg/L
68003	CCB		CCB	Cadmium	0.437	µg/L	2.2 µg/L
68003	CCB		CCB	Calcium	67.3	µg/L	336.5 µg/L
68003	CCB		CCB	Chromium	0.746	µg/L	3.7 µg/L
68003	CCB		CCB	Cobalt	1.16	µg/L	5.8 µg/L
68003	CCB		CCB	Copper	1.83	µg/L	9.15 µg/L
68003	CCB		CCB	Iron	20.1	µg/L	100.5 µg/L
68003	CCB		CCB	Lead	1.98	µg/L	9.9 µg/L
68003	CCB		CCB	Magnesium	51.2	µg/L	256.0 µg/L
68003	CCB		CCB	Manganese	0.429	µg/L	2.2 µg/L
68003	CCB		CCB	Nickel	1.02	µg/L	5.1 µg/L
68003	CCB		CCB	Selenium	3.30	µg/L	16.5 µg/L
68003	CCB		CCB	Sodium	103.0	µg/L	515.0 µg/L
68003	1200309604	1200309604	LB	Aluminum	36.4	µg/L	182.0 µg/L
68003	1200309604	1200309604	LB	Barium	0.264	µg/L	1.32 µg/L
68003	1200309604	1200309604	LB	Copper	5.29	µg/L	26.5 µg/L
68003	1200309604	1200309604	LB	Iron	3.67	µg/L	18.35 µg/L
68003	1200309604	1200309604	LB	Magnesium	5.79	µg/L	28.95 µg/L
68003	1200309604	1200309604	LB	Zinc	5.03	µg/L	25.15 µg/L

TABLE 9
Blank Contamination: Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

68003	054EW002M2	68003006	EB	Barium	0.275	µg/L	1.375 µg/L
68003	054EW002M2	68003006	EB	Iron	5.90	µg/L	29.5 µg/L
68003	054EW002M2	68003006	EB	Lead	1.75	µg/L	8.75 µg/L
68003	054EW002M2	68003006	EB	Magnesium	5.20	µg/L	26.0 µg/L
68003	054EW002M2	68003006	EB	Sodium	127.0	µg/L	635.0 µg/L
68005	CCB		CCB	Aluminum, dissolved	63.4	µg/L	317.0 µg/L
68005	CCB		CCB	Barium, dissolved	0.512	µg/L	2.56 µg/L
68005	CCB		CCB	Beryllium, dissolved	0.317	µg/L	1.58 µg/L
68005	CCB		CCB	Cadmium, dissolved	0.437	µg/L	2.2 µg/L
68005	CCB		CCB	Calcium, dissolved	67.3	µg/L	336.5 µg/L
68005	CCB		CCB	Chromium, dissolved	0.746	µg/L	3.7 µg/L
68005	CCB		CCB	Cobalt, dissolved	1.16	µg/L	5.8 µg/L
68005	CCB		CCB	Copper, dissolved	1.83	µg/L	9.15 µg/L
68005	CCB		CCB	Iron, dissolved	20.1	µg/L	100.5 µg/L
68005	CCB		CCB	Lead, dissolved	1.98	µg/L	9.9 µg/L
68005	CCB		CCB	Magnesium, dissolved	51.2	µg/L	256.0 µg/L
68005	CCB		CCB	Manganese, dissolved	0.429	µg/L	2.2 µg/L
68005	CCB		CCB	Nickel, dissolved	1.02	µg/L	5.1 µg/L
68005	CCB		CCB	Selenium, dissolved	3.30	µg/L	16.5 µg/L
68005	CCB		CCB	Sodium, dissolved	103.0	µg/L	515.0 µg/L
68005	1200309604	1200309604	LB	Aluminum, dissolved	36.4	µg/L	182.0 µg/L
68005	1200309604	1200309604	LB	Barium, dissolved	0.264	µg/L	1.32 µg/L
68005	1200309604	1200309604	LB	Copper, dissolved	5.29	µg/L	26.5 µg/L
68005	1200309604	1200309604	LB	Iron, dissolved	3.67	µg/L	18.35 µg/L
68005	1200309604	1200309604	LB	Magnesium, dissolved	5.79	µg/L	28.95 µg/L
68005	1200309604	1200309604	LB	Zinc, dissolved	5.03	µg/L	25.15 µg/L
68005	054EW002M2	68005006	EB	Aluminum, dissolved	45.2	µg/L	226.0 µg/L

TABLE 9
Blank Contamination: Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

68005	054EW002M2	68005006	EB	Barium, dissolved	0.325	µg/L	1.625 µg/L
68005	054EW002M2	68005006	EB	Iron, dissolved	3.41	µg/L	17.05 µg/L
68005	054EW002M2	68005006	EB	Calcium, dissolved	38.8	µg/L	194.0 µg/L
68005	054EW002M2	68005006	EB	Magnesium, dissolved	11.1	µg/L	55.5 µg/L
68005	054EW002M2	68005006	EB	Sodium, dissolved	297.0	µg/L	1485.0 µg/L
68005	054EW002M2	68005006	EB	Potassium, dissolved	22.0	µg/L	110.0 µg/L
68128	CCB		CCB	Lead	2.53	µg/L	12.7 mg/Kg
68128	1200310709	1200310709	LB	Mercury	0.008	mg/Kg	0.04 mg/Kg
72560	CCB		CCB	Lead	3.10	µg/L	0.775 mg/Kg

** Results from equipment blank 054EB040M1 (67241001) were not used to qualify data for blank contamination. Potable water was used for the equipment blank sample, therefore the results were considered to be anomalous and not consistent with analyte levels typically found in equipment blank samples.

TABLE 10
Blank Contamination: TCLP and SPLP Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

67242	CCB		CCB	Lead, SPLP	2.21	µg/L	0.01105 mg/L
67242	CCB		CCB	Thallium, SPLP	35.6	µg/L	0.178 mg/L
72560	CCB		CCB	Lead, TCLP	3.10	µg/L	0.0155 mg/L
72560	CCB		CCB	Selenium, TCLP	5.07	µg/L	0.02535 mg/L
72560	1200357462	1200357462	LB	Lead, TCLP	0.024	mg/L	0.12 mg/L
75039	1200381721	1200381721	LB	Mercury, TCLP	0.001	mg/L	0.005 mg/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 - MS/MSD and LCS

All Matrix Spike (MS), Matrix Spike Duplicate (MSD), and Laboratory Control Sample (LCS) recoveries were within acceptable quality control limits, except as noted in Table 11 and Table 12 below.

TABLE 11
MS/MSD, and LCS Recoveries Out of QC Limits: Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

Site	Sample	Parameter	Recovery	Recovery Limits	Associated Samples	Flag
67238	67238001 MS/MSD	Antimony	44.5* / 50.2*	80-120	67238 – All	Detects-J, non-detects-UJ
		Barium	69.9* / 72.8*			
		Copper	29.8* / 30.4*			
		Lead	36.2* / 28.3			
		Manganese	54.6* / 59.1*			
		Magnesium	128.0* / 132.2*	80-120	67238 – All	Detects only - J
		Potassium	122.3* / 128.3*			
68128	68128001 MS/MSD	Antimony	59.8* / 61.2*	80-120	68128 – All	Detects-J, non-detects-UJ
		Mercury	129.7* / 121.7*	80-120	68128 – All	Detects only - J
72560	72560001 MS/MSD	Antimony	40.6* / 37.0*	80-120	72560 – All	Detects-J, non-detects-UJ
* - out of control limits						

TABLE 12
MS/MSD, and LCS Recoveries Out of QC Limits: TCLP and SPLP Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

Site	Sample	Parameter	Recovery	Recovery Limits	Associated Samples	Flag
67242	67242001 MS/MSD	Mercury, SPLP	55* / 62.5*	80-120	67242 – All	Detects-J, non-detects-UJ
72560	72560001 MS/MSD	Lead, TCLP	77.9* / 81.7	80-120	72560 – All	Detects-J, non-detects-UJ
		Mercury, TCLP	82.5 / 69.5*			

TABLE 12
MS/MSD, and LCS Recoveries Out of QC Limits: TCLP and SPLP Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75039	75039001 MS/MSD	Mercury, TCLP	85 / 68.5*	80-120	75039 – All	Detects-J, non-detects-UJ
* - out of control limits						

Field Duplicate Samples

All Field Duplicate Samples were within acceptable quality control limits, except as noted in Table 13 below. No flags are applied due to Field Duplicate precision.

TABLE 13
Field Duplicate RPDs Out of QC Limits: Metals
Charleston Naval Complex, , Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67238	054SB04301 / 054CB04301	Chromium	19.4 mg/Kg	59.9 mg/Kg	102.1*	35
		Iron	10300 mg/Kg	91200 mg/Kg	159.4*	35
		Lead	215 mg/Kg	116 mg/Kg	59.8*	35
		Manganese	64.5 mg/Kg	441 mg/Kg	149.0*	35
* - out of control limits						

ICP Serial Dilution

All Serial Dilution recoveries were within acceptable quality control limits, except as noted in Table 14 below.

TABLE 14
Serial Dilution Recoveries Out of QC Limits: Metals
Charleston Naval Complex, Zone E, SWMU 21/54, Charleston, SC

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67238	Iron	10.5*	10	67238 – All	Detects-J, non-detects-UJ
* - out of control limits					

Rejected Data

All of the rejected data listed in Attachment I were associated with re-runs and dilutions (there can only be 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 Zone E, SWMU 21/54 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 - Chan ualifiers and Results
Zone E, SWMU 2 . - Data Validation

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
FLTMET	SW6010B	ALUMINUM, Dissolved	68005	021GW01RM2	68005001	WG	16.4	B	16.4	U	ug/L	BL
FLTMET	SW6010B	ALUMINUM, Dissolved	68005	021GW002RM2	68005002	WG	12.8	B	12.8	U	ug/L	BL
FLTMET	SW6010B	ANTIMONY, Dissolved	68005	054GW002M2	68005003	WG	18.1	B	18.1	J	ug/L	IB
FLTMET	SW6010B	ARSENIC, Dissolved	68005	021GW004M2	68005004	WG	7.14	B	7.14	J	ug/L	IB
FLTMET	SW6010B	ARSENIC, Dissolved	68005	021HW004M2	68005005	WG	4.19	B	4.19	J	ug/L	IB
FLTMET	SW6010B	BARIUM, Dissolved	68005	021GW002RM2	68005002	WG	34.9	B	34.9	J	ug/L	IB
FLTMET	SW6010B	BARIUM, Dissolved	68005	054GW002M2	68005003	WG	68.4	B	68.4	J	ug/L	IB
FLTMET	SW6010B	CADMIUM, Dissolved	68005	021GW01RM2	68005001	WG	0.253	B	0.253	U	ug/L	BL
FLTMET	SW6010B	CADMIUM, Dissolved	68005	054GW002M2	68005003	WG	0.536	B	0.536	U	ug/L	BL
FLTMET	SW6010B	CHROMIUM, TOTAL, Dissolved	68005	021GW002RM2	68005002	WG	0.61	B	0.61	U	ug/L	BL
FLTMET	SW6010B	COPPER, Dissolved	68005	054GW002M2	68005003	WG	3.03	B	3.03	U	ug/L	BL
FLTMET	SW6010B	COPPER, Dissolved	68005	021HW004M2	68005005	WG	1.54	B	1.54	U	ug/L	BL
FLTMET	SW6010B	IRON, Dissolved	68005	021GW01RM2	68005001	WG	13.6	B	13.6	U	ug/L	BL
FLTMET	SW6010B	LEAD, Dissolved	68005	021GW01RM2	68005001	WG	3.99	=	3.99	U	ug/L	BL
FLTMET	SW6010B	LEAD, Dissolved	68005	021GW002RM2	68005002	WG	1.46	B	1.46	U	ug/L	BL
FLTMET	SW6010B	LEAD, Dissolved	68005	054GW002M2	68005003	WG	1.49	B	1.49	U	ug/L	BL
FLTMET	SW6010B	LEAD, Dissolved	68005	021GW004M2	68005004	WG	2.15	B	2.15	U	ug/L	BL
FLTMET	SW6010B	LEAD, Dissolved	68005	021HW004M2	68005005	WG	1.65	B	1.65	U	ug/L	BL
FLTMET	SW6010B	NICKEL, Dissolved	68005	021GW002RM2	68005002	WG	2.69	B	2.69	U	ug/L	BL
FLTMET	SW6010B	NICKEL, Dissolved	68005	054GW002M2	68005003	WG	10.9	B	10.9	J	ug/L	IB
FLTMET	SW6010B	NICKEL, Dissolved	68005	021GW004M2	68005004	WG	0.872	B	0.872	U	ug/L	BL
FLTMET	SW6010B	POTASSIUM, Dissolved	68005	021GW01RM2	68005001	WG	52700	B	52700	J	ug/L	IB
FLTMET	SW6010B	POTASSIUM, Dissolved	68005	054GW002M2	68005003	WG	59400	B	59400	J	ug/L	IB
FLTMET	SW6010B	THALLIUM, Dissolved	68005	021HW004M2	68005005	WG	5.79	B	5.79	J	ug/L	IB
FLTMET	SW6010B	ZINC, Dissloved	68005	021GW01RM2	68005001	WG	4.26	B	4.26	U	ug/L	BL
FLTMET	SW6010B	ZINC, Dissloved	68005	021GW002RM2	68005002	WG	12.1	B	12.1	U	ug/L	BL
FLTMET	SW6010B	ZINC, Dissloved	68005	021GW004M2	68005004	WG	1.77	B	1.77	U	ug/L	BL
FLTMET	SW6010B	ZINC, Dissloved	68005	021HW004M2	68005005	WG	3.63	B	3.63	U	ug/L	BL
METAL	SW6010B	ALUMINUM	68003	021GW01RM2	68003001	WG	228	=	228	U	ug/L	BL
METAL	SW6010B	ALUMINUM	68003	054GW002M2	68003003	WG	26	B	26	U	ug/L	BL
METAL	SW6010B	ALUMINUM	68003	021GW004M2	68003004	WG	31.3	B	31.3	U	ug/L	BL

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Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	ALUMINUM	68003	021HW004M2	68003005	WG	59.5	B	59.5	U	ug/L	BL
METAL	SW6010B	ANTIMONY	67238	054SB04701	67238001	SO	0.545	MS	0.545	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054SB05201	67238002	SO	5.35	BN	5.35	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054SB04101	67238003	SO	5.9	BN	5.9	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054SB04201	67238004	SO	0.519	UN	0.519	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054SB04301	67238005	SO	0.576	UN	0.576	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054CB04301	67238006	SO	2.48	BN	2.48	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054SB04401	67238007	SO	0.565	UN	0.565	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054SB04501	67238008	SO	10.9	BN	10.9	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	67238	054SB04601	67238009	SO	0.523	UN	0.523	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	68003	054GW002M2	68003003	WG	24.9	B	24.9	J	ug/L	IB
METAL	SW6010B	ANTIMONY	68128	054SB04801	68128001	SO	2.07	BN	2.07	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	68128	054SB04802	68128002	SO	532	N	532	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	68128	054SB04901	68128003	SO	4.47	BN	4.47	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	68128	054SB04902	68128004	SO	0.837	BN	0.837	J	mg/kg	MS
METAL	SW6010B	ANTIMONY	68128	054SB05001	68128005	SO	0.529	UN	0.529	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	68128	054SB05002	68128006	SO	0.579	UN	0.579	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	68128	054SB05101	68128007	SO	0.58	UN	0.58	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	68128	054SB05102	68128008	SO	0.547	UN	0.547	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	72560	054SB05202	72560001	SO	0.765	UN	0.765	UJ	mg/kg	MS
METAL	SW6010B	ANTIMONY	72560	054CB05202	72560002	SO	8.71	BN	8.71	J	mg/kg	MS
METAL	SW6010B	ARSENIC	67238	054SB04701	67238001	SO	1.51	IB	1.51	J	mg/kg	IB
METAL	SW6010B	BARIUM	67238	054SB04701	67238001	SO	24.6	MS	24.6	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054SB05201	67238002	SO	32.9	BN	32.9	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054SB04101	67238003	SO	88.3	N	88.3	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054SB04201	67238004	SO	57	N	57	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054SB04301	67238005	SO	43.1	BN	43.1	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054CB04301	67238006	SO	39.1	BN	39.1	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054SB04401	67238007	SO	19.5	BN	19.5	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054SB04501	67238008	SO	122	N	122	J	mg/kg	MS
METAL	SW6010B	BARIUM	67238	054SB04601	67238009	SO	26.8	BN	26.8	J	mg/kg	MS

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	BARIUM	68003	021GW002RM2	68003002	WG	55.2	B	55.2	J	ug/L	IB
METAL	SW6010B	BARIUM	68003	054GW002M2	68003003	WG	73.8	B	73.8	J	ug/L	IB
METAL	SW6010B	BARIUM, TCLP	72560	054VA001M3	72560010	SO	0.393	B	0.393	J	mg/L	IB
METAL	SW6010B	BARIUM, TCLP	75039	054VA001N2	75039001	SO	0.637	B	0.637	J	mg/L	IB
METAL	SW6010B	BERYLLIUM	67238	054SB04701	67238001	SO	0.256	IB	0.256	J	mg/kg	IB
METAL	SW6010B	BERYLLIUM	67238	054SB05201	67238002	SO	0.189	B	0.189	J	mg/kg	IB
METAL	SW6010B	BERYLLIUM	67238	054SB04101	67238003	SO	0.382	B	0.382	J	mg/kg	IB
METAL	SW6010B	BERYLLIUM	67238	054SB04201	67238004	SO	0.39	B	0.39	J	mg/kg	IB
METAL	SW6010B	BERYLLIUM	67238	054SB04301	67238005	SO	0.331	B	0.331	J	mg/kg	IB
METAL	SW6010B	BERYLLIUM	67238	054CB04301	67238006	SO	0.33	B	0.33	J	mg/kg	IB
METAL	SW6010B	BERYLLIUM	67238	054SB04401	67238007	SO	0.107	B	0.107	U	mg/kg	BL
METAL	SW6010B	BERYLLIUM	67238	054SB04601	67238009	SO	0.32	B	0.32	J	mg/kg	IB
METAL	SW6010B	CADMIUM	67238	054SB04701	67238001	SO	0.087	BL	0.087	U	mg/kg	BL
METAL	SW6010B	CADMIUM	67238	054SB04201	67238004	SO	0.155	B	0.155	J	mg/kg	IB
METAL	SW6010B	CADMIUM	67238	054SB04301	67238005	SO	0.138	B	0.138	J	mg/kg	IB
METAL	SW6010B	CADMIUM	67238	054SB04601	67238009	SO	0.338	B	0.338	J	mg/kg	IB
METAL	SW6010B	CADMIUM	68003	021GW01RM2	68003001	WG	0.522	B	0.522	U	ug/L	BL
METAL	SW6010B	CADMIUM	68003	021GW002RM2	68003002	WG	0.288	B	0.288	U	ug/L	BL
METAL	SW6010B	CADMIUM	68003	054GW002M2	68003003	WG	0.795	B	0.795	U	ug/L	BL
METAL	SW6010B	CADMIUM	68003	021HW004M2	68003005	WG	0.343	B	0.343	U	ug/L	BL
METAL	SW6010B	CADMIUM, TCLP	72560	054VA001M3	72560010	SO	0.016	B	0.016	J	mg/L	IB
METAL	SW6010B	CADMIUM, TCLP	75039	054VA001N2	75039001	SO	0.009	B	0.009	J	mg/L	IB
METAL	SW6010B	CALCIUM	67238	054SB04401	67238007	SO	265	B	265	J	mg/kg	IB
METAL	SW6010B	CHROMIUM, TOTAL	68003	021GW01RM2	68003001	WG	0.692	B	0.692	U	ug/L	BL
METAL	SW6010B	CHROMIUM, TOTAL	68003	021GW002RM2	68003002	WG	1.65	B	1.65	U	ug/L	BL
METAL	SW6010B	CHROMIUM, TOTAL	68003	054GW002M2	68003003	WG	1.56	B	1.56	U	ug/L	BL
METAL	SW6010B	CHROMIUM, TOTAL, TCLP	72560	054VA001M3	72560010	SO	0.041	B	0.041	J	mg/L	IB
METAL	SW6010B	CHROMIUM, TOTAL, TCLP	75039	054VA001N2	75039001	SO	0.017	B	0.017	J	mg/L	IB
METAL	SW6010B	COBALT	67238	054SB04701	67238001	SO	2.01	IB	2.01	J	mg/kg	IB
METAL	SW6010B	COBALT	67238	054SB05201	67238002	SO	1.98	B	1.98	J	mg/kg	IB
METAL	SW6010B	COBALT	67238	054SB04101	67238003	SO	4.11	B	4.11	J	mg/kg	IB

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Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	COBALT	67238	054SB04201	67238004	SO	2.79	B	2.79	J	mg/kg	IB
METAL	SW6010B	COBALT	67238	054SB04301	67238005	SO	1.71	B	1.71	J	mg/kg	IB
METAL	SW6010B	COBALT	67238	054CB04301	67238006	SO	3.5	B	3.5	J	mg/kg	IB
METAL	SW6010B	COBALT	67238	054SB04401	67238007	SO	0.619	B	0.619	J	mg/kg	IB
METAL	SW6010B	COBALT	67238	054SB04601	67238009	SO	1.66	B	1.66	J	mg/kg	IB
METAL	SW6010B	COPPER	67238	054SB04701	67238001	SO	31	MS	31	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054SB05201	67238002	SO	226	N	226	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054SB04101	67238003	SO	253	N	253	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054SB04201	67238004	SO	36.1	N	36.1	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054SB04301	67238005	SO	84.9	N	84.9	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054CB04301	67238006	SO	85.6	N	85.6	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054SB04401	67238007	SO	1.92	BN	1.92	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054SB04501	67238008	SO	523	N	523	J	mg/kg	MS
METAL	SW6010B	COPPER	67238	054SB04601	67238009	SO	25.3	N	25.3	J	mg/kg	MS
METAL	SW6010B	COPPER	68003	021GW01RM2	68003001	WG	4.1	B	4.1	U	ug/L	BL
METAL	SW6010B	COPPER	68003	021GW002RM2	68003002	WG	1.86	B	1.86	U	ug/L	BL
METAL	SW6010B	COPPER	68003	054GW002M2	68003003	WG	21.7	B	21.7	U	ug/L	BL
METAL	SW6010B	COPPER	68003	021GW004M2	68003004	WG	1.41	B	1.41	U	ug/L	BL
METAL	SW6010B	COPPER	68003	021HW004M2	68003005	WG	1.64	B	1.64	U	ug/L	BL
METAL	SW6010B	IRON	67238	054SB04701	67238001	SO	4850	SD	4850	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054SB05201	67238002	SO	10300	E*	10300	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054SB04101	67238003	SO	16800	E*	16800	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054SB04201	67238004	SO	13100	E*	13100	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054SB04301	67238005	SO	10300	E*	10300	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054CB04301	67238006	SO	91200	E*	91200	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054SB04401	67238007	SO	12500	E*	12500	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054SB04501	67238008	SO	27300	E*	27300	J	mg/kg	SD
METAL	SW6010B	IRON	67238	054SB04601	67238009	SO	8120	E*	8120	J	mg/kg	SD
METAL	SW6010B	LEAD	67238	054SB04701	67238001	SO	47.4	MS	47.4	J	mg/kg	MS
METAL	SW6010B	LEAD	67238	054SB05201	67238002	SO	1230	N	1230	J	mg/kg	MS
METAL	SW6010B	LEAD	67238	054SB04101	67238003	SO	673	N	673	J	mg/kg	MS

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	LEAD	67238	054SB04201	67238004	SO	135	N	135	J	mg/kg	MS
METAL	SW6010B	LEAD	67238	054SB04301	67238005	SO	215	N	215	J	mg/kg	MS
METAL	SW6010B	LEAD	67238	054CB04301	67238006	SO	116	N	116	J	mg/kg	MS
METAL	SW6010B	LEAD	67238	054SB04401	67238007	SO	8.21	N	8.21	J	mg/kg	MS
METAL	SW6010B	LEAD	67238	054SB04501	67238008	SO	643	N	643	J	mg/kg	MS
METAL	SW6010B	LEAD	67238	054SB04601	67238009	SO	118	N	118	J	mg/kg	MS
METAL	SW6010B	LEAD	68003	021GW002RM2	68003002	WG	3.97	=	3.97	U	ug/L	BL
METAL	SW6010B	LEAD	68003	021GW004M2	68003004	WG	2.49	B	2.49	U	ug/L	BL
METAL	SW6010B	LEAD	68003	021HW004M2	68003005	WG	4.5	=	4.5	U	ug/L	BL
METAL	SW6010B	LEAD, SPLP	67242	054SB04901	67242003	SO	0.144	B	0.144	J	mg/L	IB
METAL	SW6010B	LEAD, SPLP	67242	054SB04902	67242004	SO	0.191	B	0.191	J	mg/L	IB
METAL	SW6010B	LEAD, SPLP	67242	054SB05102	67242008	SO	0.042	B	0.042	J	mg/L	IB
METAL	SW6010B	LEAD, TCLP	72560	054VA001M3	72560010	SO	11.1	=	11.1	J	mg/L	MS
METAL	SW6010B	LEAD, TCLP	75039	054VA001N2	75039001	SO	0.417	B	0.417	J	mg/L	IB
METAL	SW6010B	MAGNESIUM	67238	054SB04701	67238001	SO	405	MS	405	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054SB05201	67238002	SO	290	BN	290	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054SB04101	67238003	SO	608	BN	608	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054SB04201	67238004	SO	826	BN	826	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054SB04301	67238005	SO	1180	BN	1180	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054CB04301	67238006	SO	1170	N	1170	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054SB04401	67238007	SO	684	BN	684	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054SB04501	67238008	SO	1120	N	1120	J	mg/kg	MS
METAL	SW6010B	MAGNESIUM	67238	054SB04601	67238009	SO	919	BN	919	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054SB04701	67238001	SO	26.1	MS	26.1	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054SB05201	67238002	SO	93	N	93	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054SB04101	67238003	SO	128	N	128	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054SB04201	67238004	SO	89	N	89	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054SB04301	67238005	SO	64.5	N	64.5	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054CB04301	67238006	SO	441	N	441	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054SB04401	67238007	SO	15.2	N	15.2	J	mg/kg	MS
METAL	SW6010B	MANGANESE	67238	054SB04501	67238008	SO	244	N	244	J	mg/kg	MS

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Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	MANGANESE	67238	054SB04601	67238009	SO	50.3	N	50.3	J	mg/kg	MS
METAL	SW7471A	MERCURY	67238	054SB04701	67238001	SO	0.068	IB	0.068	J	mg/kg	IB
METAL	SW7471A	MERCURY	67238	054SB04401	67238007	SO	0.065	B	0.065	J	mg/kg	IB
METAL	SW7470A	MERCURY	68003	021GW004M2	68003004	WG	0.179	B	0.179	J	ug/L	IB
METAL	SW7471A	MERCURY	68128	054SB04801	68128001	SO	0.214	N	0.214	J	mg/kg	MS
METAL	SW7471A	MERCURY	68128	054SB04802	68128002	SO	0.684	N	0.684	J	mg/kg	MS
METAL	SW7471A	MERCURY	68128	054SB04901	68128003	SO	0.635	N	0.635	J	mg/kg	MS
METAL	SW7471A	MERCURY	68128	054SB04902	68128004	SO	0.189	N	0.189	J	mg/kg	MS
METAL	SW7471A	MERCURY	68128	054SB05001	68128005	SO	0.174	N	0.174	J	mg/kg	MS
METAL	SW7471A	MERCURY	68128	054SB05002	68128006	SO	0.02	BN	0.02	U	mg/kg	BL
METAL	SW7471A	MERCURY	68128	054SB05101	68128007	SO	0.369	N	0.369	J	mg/kg	MS
METAL	SW7471A	MERCURY	68128	054SB05102	68128008	SO	0.024	BN	0.024	U	mg/kg	BL
METAL	SW7470A	MERCURY, SPLP	67242	054SB04801	67242001	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, SPLP	67242	054SB04802	67242002	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, SPLP	67242	054SB04901	67242003	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, SPLP	67242	054SB04902	67242004	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, SPLP	67242	054SB05001	67242005	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, SPLP	67242	054SB05002	67242006	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, SPLP	67242	054SB05101	67242007	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, SPLP	67242	054SB05102	67242008	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, TCLP	72560	054VA001M3	72560010	SO	0.0004	UN	0.0004	UJ	mg/L	MS
METAL	SW7470A	MERCURY, TCLP	75039	054VA001N2	75039001	SO	0.001	UN*	0.001	UJ	mg/L	MS
METAL	SW6010B	NICKEL	67238	054SB04701	67238001	SO	5.99	IB	5.99	J	mg/kg	IB
METAL	SW6010B	NICKEL	67238	054SB04201	67238004	SO	7.2	B	7.2	J	mg/kg	IB
METAL	SW6010B	NICKEL	67238	054SB04301	67238005	SO	8.42	B	8.42	J	mg/kg	IB
METAL	SW6010B	NICKEL	67238	054SB04401	67238007	SO	2.87	B	2.87	J	mg/kg	IB
METAL	SW6010B	NICKEL	67238	054SB04601	67238009	SO	5.28	B	5.28	J	mg/kg	IB
METAL	SW6010B	NICKEL	68003	021GW002RM2	68003002	WG	2.29	B	2.29	U	ug/L	BL
METAL	SW6010B	NICKEL	68003	054GW002M2	68003003	WG	12.3	B	12.3	J	ug/L	IB
METAL	SW6010B	NICKEL	68003	021HW004M2	68003005	WG	1.02	B	1.02	U	ug/L	BL
METAL	SW6010B	POTASSIUM	67238	054SB04701	67238001	SO	262	MS	262	J	mg/kg	MS

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	POTASSIUM	67238	054SB05201	67238002	SO	237	BN	237	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	67238	054SB04101	67238003	SO	342	BN	342	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	67238	054SB04201	67238004	SO	553	BN	553	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	67238	054SB04301	67238005	SO	528	BN	528	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	67238	054CB04301	67238006	SO	499	BN	499	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	67238	054SB04401	67238007	SO	463	BN	463	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	67238	054SB04501	67238008	SO	572	BN	572	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	67238	054SB04601	67238009	SO	394	BN	394	J	mg/kg	MS
METAL	SW6010B	POTASSIUM	68003	021GW01RM2	68003001	WG	50400	B	50400	J	ug/L	IB
METAL	SW6010B	POTASSIUM	68003	054GW002M2	68003003	WG	55200	B	55200	J	ug/L	IB
METAL	SW6010B	SELENIUM	67238	054SB04701	67238001	SO	0.339	IB	0.339	J	mg/kg	IB
METAL	SW6010B	SELENIUM	67238	054SB05201	67238002	SO	0.695	B	0.695	J	mg/kg	IB
METAL	SW6010B	SELENIUM	67238	054SB04101	67238003	SO	1.05	B	1.05	J	mg/kg	IB
METAL	SW6010B	SELENIUM	67238	054SB04201	67238004	SO	1.07	B	1.07	J	mg/kg	IB
METAL	SW6010B	SELENIUM	67238	054SB04301	67238005	SO	0.502	B	0.502	J	mg/kg	IB
METAL	SW6010B	SELENIUM	67238	054SB04401	67238007	SO	0.926	B	0.926	J	mg/kg	IB
METAL	SW6010B	SELENIUM	68003	021GW004M2	68003004	WG	2.85	B	2.85	U	ug/L	BL
METAL	SW6010B	SELENIUM	68003	021HW004M2	68003005	WG	3.82	B	3.82	U	ug/L	BL
METAL	SW6010B	SILVER	67238	054SB05201	67238002	SO	0.155	B	0.155	U	mg/kg	BL
METAL	SW6010B	SILVER	67238	054SB04101	67238003	SO	0.826	B	0.826	J	mg/kg	IB
METAL	SW6010B	SILVER	67238	054CB04301	67238006	SO	0.231	B	0.231	U	mg/kg	BL
METAL	SW6010B	SILVER	67238	054SB04501	67238008	SO	0.575	B	0.575	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB04701	67238001	SO	60.5	IB	60.5	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB05201	67238002	SO	34.3	B	34.3	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB04101	67238003	SO	73.8	B	73.8	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB04201	67238004	SO	94.8	B	94.8	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB04301	67238005	SO	883	B	883	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054CB04301	67238006	SO	818	B	818	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB04401	67238007	SO	1130	B	1130	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB04501	67238008	SO	813	B	813	J	mg/kg	IB
METAL	SW6010B	SODIUM	67238	054SB04601	67238009	SO	95.1	B	95.1	J	mg/kg	IB

Attachment 1 - Changed Qualifiers and Results
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Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
METAL	SW6010B	THALLIUM, SPLP	67242	054SB04901	67242003	SO	0.06	B	0.06	U	mg/L	BL
METAL	SW6010B	VANADIUM	67238	054SB05201	67238002	SO	9.52	B	9.52	J	mg/kg	IB
METAL	SW6010B	VANADIUM	67238	054SB04101	67238003	SO	10.7	B	10.7	J	mg/kg	IB
METAL	SW6010B	VANADIUM	68003	021GW01RM2	68003001	WG	1.11	B	1.11	J	ug/L	IB
METAL	SW6010B	VANADIUM	68003	021GW002RM2	68003002	WG	1.31	B	1.31	J	ug/L	IB
METAL	SW6010B	VANADIUM	68003	054GW002M2	68003003	WG	1.13	B	1.13	J	ug/L	IB
METAL	SW6010B	ZINC	68003	021GW004M2	68003004	WG	10.8	B	10.8	U	ug/L	BL
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB04701	67237001	SO	1830	U	1830	UJ	ug/kg	CC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB05201	67237002	SO	6890	U	6890	UJ	ug/kg	CC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB04101	67237003	SO	1810	U	1810	UJ	ug/kg	IC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB04201	67237004	SO	19100	U	19100	UJ	ug/kg	CC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB04301	67237005	SO	1990	U	1990	UJ	ug/kg	CC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054CB04301	67237006	SO	1930	U	1930	UJ	ug/kg	CC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB04401	67237007	SO	1900	U	1900	UJ	ug/kg	CC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB04501	67237008	SO	1860	U	1860	UJ	ug/kg	CC
SVOA	SW8270C	2,4-DINITROPHENOL	67237	054SB04601	67237009	SO	1790	U	1790	UJ	ug/kg	CC
SVOA	SW8270C	2-NITROANILINE	67237	054SB04101	67237003	SO	1810	U	1810	UJ	ug/kg	IC
SVOA	SW8270C	4,6-DINITRO-2-METHYLPHENOL	67237	054SB04101	67237003	SO	1810	U	1810	UJ	ug/kg	IC
SVOA	SW8270C	4-NITROPHENOL	67237	054SB04101	67237003	SO	1810	U	1810	UJ	ug/kg	CC
SVOA	SW8270C	ACENAPHTHENE	72560	054SB05701DL	72560007	SO	64.2	JD	64.2	R	ug/kg	DL
SVOA	SW8270C	ACENAPHTHYLENE	72560	054SB05701DL	72560007	SO	141	U	141	R	ug/kg	DL
SVOA	SW8270C	ANTHRACENE	72560	054SB05402	72560004	SO	38.5	U	38.5	UJ	ug/kg	IS
SVOA	SW8270C	ANTHRACENE	72560	054SB05701DL	72560007	SO	110	JD	110	R	ug/kg	DL
SVOA	SW8270C	BENZO(a)ANTHRACENE	72560	054SB05701DL	72560007	SO	1530	D	1530	R	ug/kg	DL
SVOA	SW8270C	BENZO(a)PYRENE	72560	054SB05701DL	72560007	SO	919	D	919	R	ug/kg	DL
SVOA	SW8270C	BENZO(b)FLUORANTHENE	72560	054SB05701DL	72560007	SO	1980	D	1980	R	ug/kg	DL
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72560	054SB05202	72560001	SO	39.4	U	39.4	UJ	ug/kg	CC
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72560	054CB05202	72560002	SO	38.7	U	38.7	UJ	ug/kg	CC
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72560	054SB05302	72560003	SO	1320	=	1320	J	ug/kg	CC
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72560	054SB05503	72560005	SO	905	=	905	J	ug/kg	CC
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72560	054SB05601	72560006	SO	665	=	665	J	ug/kg	CC

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72560	054SB05701	72560007	SO	417	=	417	J	ug/kg	CC
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72560	054SB05701DL	72560007	SO	387	D	387	R	ug/kg	DL
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72562	021GW01RM3	72562003	WG	0.99	U	0.99	UJ	ug/L	IC
SVOA	SW8270C	BENZO(g,h,i)PERYLENE	72562	021GW004M3	72562004	WG	1	U	1	UJ	ug/L	IC
SVOA	SW8270C	BENZO(k)FLUORANTHENE	72560	054SB05701DL	72560007	SO	141	U	141	R	ug/kg	DL
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054SB04701	67237001	SO	377	U	377	UJ	ug/kg	CC
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054SB05201	67237002	SO	1420	U	1420	UJ	ug/kg	CC
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054SB04201	67237004	SO	3940	U	3940	UJ	ug/kg	CC
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054SB04301	67237005	SO	410	U	410	UJ	ug/kg	CC
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054CB04301	67237006	SO	398	U	398	UJ	ug/kg	CC
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054SB04401	67237007	SO	392	U	392	UJ	ug/kg	CC
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054SB04501	67237008	SO	383	U	383	UJ	ug/kg	CC
SVOA	SW8270C	2-CHLOROETHYL ETHER	67237	054SB04601	67237009	SO	370	U	370	UJ	ug/kg	CC
SVOA	SW8270C	bis(2-ETHYLHEXYL) PHTHALATE	67237	054SB04701	67237001	SO	58.8	J	377	U	ug/kg	BL
SVOA	SW8270C	bis(2-ETHYLHEXYL) PHTHALATE	67237	054SB05201	67237002	SO	2240	=	2240	U	ug/kg	BL
SVOA	SW8270C	bis(2-ETHYLHEXYL) PHTHALATE	67237	054CB04301	67237006	SO	90.7	J	398	U	ug/kg	BL
SVOA	SW8270C	bis(2-ETHYLHEXYL) PHTHALATE	67237	054SB04501	67237008	SO	125	J	383	U	ug/kg	BL
SVOA	SW8270C	bis(2-ETHYLHEXYL) PHTHALATE	67237	054SB04601	67237009	SO	98.7	J	370	U	ug/kg	BL
SVOA	SW8270C	CARBAZOLE	67237	054SB04101	67237003	SO	27	J	27	J	ug/kg	CC
SVOA	SW8270C	CHRYSENE	72560	054SB05701DL	72560007	SO	1380	D	1380	R	ug/kg	DL
SVOA	SW8270C	DIBENZ(a,h)ANTHRACENE	72560	054SB05202	72560001	SO	39.4	U	39.4	UJ	ug/kg	CC
SVOA	SW8270C	DIBENZ(a,h)ANTHRACENE	72560	054CB05202	72560002	SO	38.7	U	38.7	UJ	ug/kg	CC
SVOA	SW8270C	DIBENZ(a,h)ANTHRACENE	72560	054SB05302	72560003	SO	174	U	174	UJ	ug/kg	CC
SVOA	SW8270C	DIBENZ(a,h)ANTHRACENE	72560	054SB05503	72560005	SO	162	U	162	UJ	ug/kg	CC
SVOA	SW8270C	DIBENZ(a,h)ANTHRACENE	72560	054SB05601	72560006	SO	36.5	U	36.5	UJ	ug/kg	CC
SVOA	SW8270C	DIBENZ(a,h)ANTHRACENE	72560	054SB05701	72560007	SO	35.3	U	35.3	UJ	ug/kg	CC
SVOA	SW8270C	DIBENZ(a,h)ANTHRACENE	72560	054SB05701DL	72560007	SO	141	U	141	R	ug/kg	DL
SVOA	SW8270C	DI-n-OCTYLPHTHALATE	67237	054SB04101	67237003	SO	373	U	373	UJ	ug/kg	IC
SVOA	SW8270C	FLUORANTHENE	72560	054SB05402	72560004	SO	43.6	=	43.6	J	ug/kg	IS
SVOA	SW8270C	FLUORANTHENE	72560	054SB05701DL	72560007	SO	2900	D	2900	R	ug/kg	DL
SVOA	SW8270C	FLUORENE	72560	054SB05701DL	72560007	SO	141	U	141	R	ug/kg	DL

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Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB04701	67237001	SO	377	U	377	UJ	ug/kg	IC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB05201	67237002	SO	1420	U	1420	UJ	ug/kg	IC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB04101	67237003	SO	373	U	373	UJ	ug/kg	CC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB04201	67237004	SO	3940	U	3940	UJ	ug/kg	IC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB04301	67237005	SO	410	U	410	UJ	ug/kg	IC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054CB04301	67237006	SO	398	U	398	UJ	ug/kg	IC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB04401	67237007	SO	392	U	392	UJ	ug/kg	IC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB04501	67237008	SO	383	U	383	UJ	ug/kg	IC
SVOA	SW8270C	HEXACHLOROCYCLOPENTADIENE	67237	054SB04601	67237009	SO	370	U	370	UJ	ug/kg	IC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72560	054SB05202	72560001	SO	39.4	U	39.4	UJ	ug/kg	CC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72560	054CB05202	72560002	SO	38.7	U	38.7	UJ	ug/kg	CC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72560	054SB05302	72560003	SO	1410	=	1410	J	ug/kg	CC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72560	054SB05503	72560005	SO	832	=	832	J	ug/kg	CC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72560	054SB05601	72560006	SO	595	=	595	J	ug/kg	CC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72560	054SB05701	72560007	SO	381	=	381	J	ug/kg	CC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72560	054SB05701DL	72560007	SO	342	D	342	R	ug/kg	DL
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72562	021GW01RM3	72562003	WG	0.99	U	0.99	UJ	ug/L	IC
SVOA	SW8270C	INDENO(1,2,3-c,d)PYRENE	72562	021GW004M3	72562004	WG	1	U	1	UJ	ug/L	IC
SVOA	SW8270C	NAPHTHALENE	72560	054SB05701DL	72560007	SO	141	U	141	R	ug/kg	DL
SVOA	SW8270C	PHENANTHRENE	72560	054SB05402	72560004	SO	23	J	23	J	ug/kg	IS
SVOA	SW8270C	PHENANTHRENE	72560	054SB05701DL	72560007	SO	674	D	674	R	ug/kg	DL
SVOA	SW8270C	PYRENE	67237	054SB04101	67237003	SO	570	=	570	J	ug/kg	IC
SVOA	SW8270C	PYRENE	72560	054SB05202	72560001	SO	69.3	=	69.3	J	ug/kg	CC
SVOA	SW8270C	PYRENE	72560	054CB05202	72560002	SO	32.7	J	32.7	J	ug/kg	CC
SVOA	SW8270C	PYRENE	72560	054SB05302	72560003	SO	5190	=	5190	J	ug/kg	CC
SVOA	SW8270C	PYRENE	72560	054SB05402	72560004	SO	63.6	=	63.6	J	ug/kg	IS
SVOA	SW8270C	PYRENE	72560	054SB05503	72560005	SO	3220	=	3220	J	ug/kg	CC
SVOA	SW8270C	PYRENE	72560	054SB05601	72560006	SO	1420	=	1420	J	ug/kg	CC
SVOA	SW8270C	PYRENE	72560	054SB05701	72560007	SO	4560	E	4560	R	ug/kg	LR
SVOA	SW8270C	PYRENE	72562	021GW004M3	72562004	WG	1.2	=	1.2	J	ug/L	CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB04701	67237001	SO	5	U	5	UJ	ug/kg	IC,CC,MS

Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB05201	67237002	SO	5.3	U	5.3	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB04101	67237003	SO	5.3	U	5.3	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB04201	67237004	SO	5	U	5	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB04301	67237005	SO	4.8	U	4.8	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054CB04301	67237006	SO	5.2	U	5.2	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB04401	67237007	SO	4.8	U	4.8	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB04501	67237008	SO	5.3	U	5.3	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,3-Trichlorobenzene	67237	054SB04601	67237009	SO	4.9	U	4.9	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB04701	67237001	SO	5	U	5	UJ	ug/kg	IC,CC,MS
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB05201	67237002	SO	5.3	U	5.3	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB04101	67237003	SO	5.3	U	5.3	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB04201	67237004	SO	5	U	5	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB04301	67237005	SO	4.8	U	4.8	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054CB04301	67237006	SO	5.2	U	5.2	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB04401	67237007	SO	4.8	U	4.8	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB04501	67237008	SO	5.3	U	5.3	UJ	ug/kg	IC,CC
VOA	SW8260B	1,2,4-TRICHLOROBENZENE	67237	054SB04601	67237009	SO	4.9	U	4.9	UJ	ug/kg	IC,CC
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB04701	67237001	SO	10	U	10	UJ	ug/kg	CC,BS,MS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB05201	67237002	SO	10.6	U	10.6	UJ	ug/kg	CC,BS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB04101	67237003	SO	10.7	U	10.7	UJ	ug/kg	CC,BS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB04201	67237004	SO	10.1	U	10.1	UJ	ug/kg	CC,BS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB04301	67237005	SO	9.7	U	9.7	UJ	ug/kg	CC,BS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054CB04301	67237006	SO	10.4	U	10.4	UJ	ug/kg	CC,BS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB04401	67237007	SO	9.6	U	9.6	UJ	ug/kg	CC,BS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB04501	67237008	SO	10.5	U	10.5	UJ	ug/kg	CC,BS
VOA	SW8260B	2-Chloroethyl vinyl ether	67237	054SB04601	67237009	SO	9.8	U	9.8	UJ	ug/kg	CC,BS
VOA	SW8260B	2-HEXANONE	67237	054SB04701	67237001	SO	10	U	10	UJ	ug/kg	CC
VOA	SW8260B	2-HEXANONE	67237	054SB05201	67237002	SO	10.6	U	10.6	UJ	ug/kg	CC
VOA	SW8260B	2-HEXANONE	67237	054SB04101	67237003	SO	10.7	U	10.7	UJ	ug/kg	CC
VOA	SW8260B	2-HEXANONE	67237	054SB04201	67237004	SO	10.1	U	10.1	UJ	ug/kg	CC
VOA	SW8260B	2-HEXANONE	67237	054SB04301	67237005	SO	9.7	U	9.7	UJ	ug/kg	CC

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Parameter Class	Analytical Method	Parameter	SDG	Sample ID	Lab Sample ID	Matrix	Lab Result	Lab Qual	Final Result	Final Qual	Units	Reasons
VOA	SW8260B	2-HEXANONE	67237	054CB04301	67237006	SO	10.4	U	10.4	UJ	ug/kg	CC
VOA	SW8260B	2-HEXANONE	67237	054SB04401	67237007	SO	9.6	U	9.6	UJ	ug/kg	CC
VOA	SW8260B	2-HEXANONE	67237	054SB04501	67237008	SO	10.5	U	10.5	UJ	ug/kg	CC
VOA	SW8260B	2-HEXANONE	67237	054SB04601	67237009	SO	9.8	U	9.8	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB04701	67237001	SO	10	U	10	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB05201	67237002	SO	10.6	U	10.6	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB04101	67237003	SO	10.7	U	10.7	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB04201	67237004	SO	10.1	U	10.1	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB04301	67237005	SO	9.7	U	9.7	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054CB04301	67237006	SO	10.4	U	10.4	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB04401	67237007	SO	9.6	U	9.6	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB04501	67237008	SO	10.5	U	10.5	UJ	ug/kg	CC
VOA	SW8260B	2-BUTANONE (MEK)	67237	054SB04601	67237009	SO	9.8	U	9.8	UJ	ug/kg	CC
VOA	SW8260B	TOLUENE	67237	054SB04701	67237001	SO	2.8	J	5	U	ug/kg	BL

4758-Metals

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: **ZE596-090502-01** page 1 of 2

Laboratory: GEL

Project Name: **Charleston Navy Complex**

Site Name: **Zone E, SWMU 21/54**

Project Number: 158814.PM.04

TAT: quick -- see Anna White

Project Manager: Tom Beisel

QA Level: level 3

Address: GNV: 3011 SW Williston Rd., Gainesville, FL 32605

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 Begin	Depth End	Date & Time Collected	Matrix	# of containers	SVOCs (SW8270C) 1 - 4 ounce jar	VOCs (SW8260B) 3 - 5g Encore & 1 - 2oz jar	Metals (SW6010/7000) 1 - 4 ounce jar	SVOCs (SW8270C) 2 - 1L amber	VOCs (SW8260B) 3 - 40mL vial, HCl	SPLP Metals * (1312/6010/7000) 1 - 8 ounce jar	Metals (SW6010/7000) 1 - 0.5 HDPE, HNO3				Comments
054SB04001	E054SB040		0	1	9.17.02/0850	SO	6	X	X	X								
054SB04101	E054SB041		0	1	9.17.02/0930	SO	6	X	X	X							*	RCRA
054SB04201	E054SB042		0	1	9.17.02/0950	SO	6	X	X	X								
054SB04301	E054SB043		0	1	9.17.02/1020	SO	6	X	X	X							*	samples complete
054CB04301	E054SB043		0	1	9.17.02/1030	SO	6	X	X	X								
054SB04401	E054SB044		0	1	9.17.02/1100	SO	6	X	X	X								
054SB04501	E054SB045		0	1	9.17.02/1120	SO	6	X	X	X								
054SB04601	E054SB046		0	1	9.17.02/1145	SO	6	X	X	X								
054SB04701	E054SB047		0	1	9.17.02/1205	SO	6	X	X	X								
054SB04701MS	E054SB047		0	1	9.17.02/1210	SO	6	X	X	X								MS
054SB04701SD	E054SB047		0	1	9.17.02/1215	SO	6	X	X	X								MSD
054EB040M1	E054EB040				9.17.02/1230	SQ	6			X	X	X		X				EB
054TB040M1	E054TB040				LAB supplied	SQ	3					X						TB
054SB04801	E054SB048		0	1	9.16.02/0915	SO	1						X					
054SB04802	E054SB048		3	5	9.16.02/0920	SO	1						X					
054SB04901	E054SB049		0	1	9.16.02/1000	SO	1						X					
054SB04902	E054SB049		3	5	9.16.02/1005	SO	1						X					
054SB05001	E054SB050		0	1	9.16.02/1030	SO	1						X					
054SB05002	E054SB050		3	5	9.16.02/1035	SO	1						X					
054SB05101	E054SB051		0	1	9.16.02/1100	SO	1						X					
054SB05102	E054SB051		3	5	9.16.02/1105	SO	1						X					

Sampled By: ANDREW O'CONOR Date/Time: 9.16 - 9.17-02 Relinquished by: [signature] Date/Time: 9-17-02/1540

Additional Samplers:

Received By Lab: [signature] Date/Time: 9-18-02 1540 Relinquished by: Date/Time:

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

Receipt Exceptions:

2007093470-0-organics -67239/
01-metals -67241/

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: ZE054-092602-01 page 1 of 2

Laboratory: GEL

Project Name: Charleston Navy Complex

Site Name: Zone E, SWMU 21/54

Project Number: 158814.PM.04

TAT: form is 7-10 days

Project Manager: Tom Beisel

QA Level: level 3

Address: GNV: 3011 SW Williston Rd., Gainesville, FL 32605

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:

68005-F
68005-F

	Sample ID	Station ID	Sample Description	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	Metals, total (SW6010B/7000) 1 - 0.5 HDPE, HNO3	Metals, dissolved * (SW6010B/7000) 1 - 0.5 HDPE, unpreserved								Comments
1	01 021GW001RM2	E021GW001R	replacement well			9-3-2002 / 1510	WG	2	X	X								
2	02 021GW002RM2	E021GW002R	replacement well			9-30-2002 / 1425	WG	2	X	X								RCRA
3	03 054GW002M2	E054GW002				9-30-2002 / 1548	WG	2	X	X								
4	04 021GW004M2	E021GW004				10-01-2002 / 0910	WG	2	X	X								
5	05 021HW004M2	E021GW004				10-01-2002 / 0910	WG	2	X	X								Samples
6	06 054EW002M2	E054EW002	EB			9-30-2002 / 0915	WQ	2	X	X								complete

Sampled By: Andrew Oconnoor / Darryl Gates

Date/Time As noted

Relinquished by: [signature]

Date/Time 10.1.02 / 1057

Additional Samplers:

Received By Lab: Pamela Littlefield

Date/Time 10/01/02 1057

Relinquished by:

Date/Time

Received By:

Date/Time

Shipped Via: UPS FedEx Hand Other Tracking#:

Recei Exceptions: [redacted]

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: **ZE054-121202-01** page 1 of 2

Laboratory: GEL

Project Name: Charleston Navy Complex

Site Name: Zone E, SWMU 21/54

Project Number: 158814.PM.04

TAT: standard

Project Manager: Tom Beisel

QA Level: level 3

Address: GNV: 3011 SW Williston Rd., Gainesville, FL 32605

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:

72560-soils
72562-waters

	Sample ID	Station ID	Sample Description	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	PAHs (SW8270C) (1 - 4 ounce jar)	PAHs (SW8270C) (2 - 1L amber)	Antimony & Lead (SW6010B) (1 - 4 ounce jar)	Antimony & Lead (SW6010B) (1 - 0.5L HDPE, HNO3)	TCLP Metals (1311/6010B) (1 - 16 ounce jar)	SVOCs (SW8270C) (2 - 1L amber)				Comments
001	054SB05202	E054SB052	Resample E054SB048	3	5	12.20.02/ 1000	SO	2	X		X							
002	054CB05202	E054SB052	resample E054SB048	3	5	12.20.02/ 1000	SO	2	X		X							
003	054SB05302	E054SB053	Resample E054SB031	3	5	12.20.02/ 1345	SO	1	X								*	RCRA
004	054SB05402	E054SB054	Resample E054SB035	3	5	12.20.02/ 1340	SO	1	X									
005	054SB05503	E054SB055	Confirm E054SB042	1	2	12.20.02/ 0930	SO	1	X									
006	054SB05601	E054SB056	confirm 10' N E054SB042	0	1	12.20.02/ 0920	SO	1	X									SAMPLES COMPLETE
007	054SB05701	E054SB057	confirm 10' S E054SB042	0	1	12.20.02/ 0900	SO	1	X									
008	054SB05801	E054SB058	confirm 10' E E054SB042	0	1	12.20.02/ 0910	SO	1	X									
009	0547SB05901	E054SB059	confirm 10' W E054SB042	0	1	12.20.02/ 0915	SO	1	X									
010	054VA001M3	E054VA001	Waste characterization			12.20.02/ 0940	SO	1					X					
01	054EB052M3 ✓	E054EB052				12.20.02/ 1010	SQ	3		X		X						EB
03	021GW001M3 ✓	E021GW001				12.20.02/ 1122	WG	2						X				
04	021GW004M3 ✓	E021GW004				12.20.02/ 1100	WG	2						X				
07	021EW001M3 ✓	E021EW001				12.20.02/ 1135	WQ	2						X				EB

Sampled By: Andrew O'Connor ; Brian Crawford Date/Time: 12/20/02

Relinquished by: [signature] Date/Time: 12/20/02 @ 1530

Additional Samplers: D. Willeman ; C. Dees

Received By Lab: [signature] Date/Time: 12/20/02 1530

Relinquished by: Date/Time

Received By: Date/Time

Shipped Via: UPS FedEx Hand Other Tracking#:

Remarks:

Temperature: 5°C

Receipt Exceptions:

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: **ZE054-011603-01** page 1 of 2

Laboratory:	GEL
Project Name:	Charleston Navy Complex
Site Name:	Zone E, SWMU 21/54
Project Number:	158814.PM.04
TAT:	7 day results
Project Manager:	Tom Beisel
QA Level:	level 3
Address:	GNV: 3011 SW Williston Rd., Gainesville, FL 32605
	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:

738664-soils
73870- Equip. Blank

Sample ID	Station ID	Sample Description	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	PAHs (SW8270C) 1 - 4 ounce jar	PAHs (SW8270C) 2 - 1L amber								Comments
054SB06001	E054SB060		0	1	1-23-03/10:50	SO	1	X									
054SB06101	E054SB061		0	1	1-23-03/10:40	SO	1	X									
054EB060N1	E054EB060				1-23-03/11:00	SQ	2		X								EB

Sampled By: [signature] Date/Time 1-23-03/10:50 - 11:00

Relinquished by: [signature] Date/Time 1-23-03/12:50

Additional Samplers: NONE

Received By Lab: J Robinson Date/Time 1-23-03/1250

Relinquished by: Date/Time

Received By: Date/Time

Shipped Via: UPS FedEx Hand Other Tracking#:

Receipt Conditions:

CH2M HILL Chain of Custody/ Laboratory Analysis Form

COC Tracking #: ZE054-121202-01 page 1 of 2

Laboratory:	GEL
Project Name:	Charleston Navy Complex
Site Name:	Zone E, SWMU 21/54
Project Number:	158814.PM.04
TAT:	standard
Project Manager:	Tom Beisel
QA Level:	level 3
Address:	GNV: 3011 SW Williston Rd., Gainesville, FL 32605
	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: 75039%

RCRA

Sample ID	Station ID	Sample Description	Depth Begin	Depth End	Date & Time Collected	Matrix	# of containers	PAHs (SW8270C) (1 - 4 ounce jar)	PAHs (SW8270C) (2 - 1L amber)	Antimony & Lead (SW6010B) (1 - 4 ounce jar)	Antimony & Lead (SW6010B) (1 - 0.5L HDPE, HNO3)	TCLP Metals (1311/6010B) (1 - 16 ounce jar)	SVOCs (SW8270C) (2 - 1L amber)				Comments
054VA001N2 ✓	054VA001	Waste characterization			2/13/03 1200	SO	1					X					composite each 2 grabs from 3 coolers

Sampled By: [signature] Date/Time: 2/13/03 1200

Additional Samplers: [signature] 2-14-03 1245

Received By Lab: [signature] Date/Time: 2-14-03 1245

Received By: Date/Time

Relinquished by: Date/Time

Relinquished by: Date/Time

Shipped Via: UPS FedEx Hand Other Tracking#:

Receipt Exceptions:

Appendix D

Location		E054SB048		E054SB048		E054SB049		E054SB049	
Sample Number		054SB04801 (surface)		054SB04802 (subsurface)		054SB04901 (surface)		054SB04902 (subsurface)	
Initial Soil Concentration	mg/kg	2.07	J	532	J	4.47	J	0.837	J
SPLP Water Concentration	mg/L	0.048	U	0.048	U	0.048	U	0.048	U
Soil mass	kg	0.1		0.1		0.1		0.1	
Water volume	L	2		2		2		2	
Total contaminant mass in soil	mg	0.207		53.2		0.447		0.0837	
Total contaminant mass in water	mg	0.048		0.048		0.048		0.048	
Adjusted soil concentration	mg/kg	1.6		531.52		3.99		0.357	
Kd	L/kg	66		22147		166		15	

For DAF = 1, SSL = Kd x MCL

		Individual SSL, mg/kg			
DAF =	1	0.40	133	1.00	0.09
DAF =	4.5	1.79	598	4.49	0.40
DAF =	42.9	17	5,700	43	3.8

MCL, mg/L 0.006

SSL = Kd x MCL x DAF

geometric mean of Kd in samples where Sb was detected in soil	245
SSL, DAF=1	1
SSL, DAF=4.5	6.6
SSL, DAF=42.9	63
min/max soil concentration, mg/Kg	0.529 UJ / 532
min/max liquid concentration, mg/L	0.048 U / 0.048 U

Location		E054SB050		E054SB050		E054SB051		E054SB051	
Sample Number		054SB05001 (surface)		054SB05002 (subsurface)		054SB05101 (surface)		054SB05102 (subsurface)	
Initial Soil Concentration	mg/kg	75.6	=	5.15	=	110	=	8.77	=
SPLP Water Concentration	mg/L	0.012	U	0.012	U	0.012	U	0.042	J
Soil mass	kg	0.1		0.1		0.1		0.1	
Water volume	L	2		2		2		2	
Total contaminant mass in soil	mg	7.56		0.515		11		0.877	
Total contaminant mass in water	mg	0.012		0.012		0.012		0.084	
Adjusted soil concentration	mg/kg	75.48		5.03		109.88		7.93	
Kd	L/kg	12580		838		18313		189	

For DAF = 1, SSL = Kd x MCL

		Individual SSL, mg/kg			
DAF =	1	189	13	275	3
DAF =	4.5	849	57	1,236	13
DAF =	42.9	8,094	539	11,783	121

MCL, mg/L 0.015

SSL = Kd x MCL x DAF

geometric mean of Kd in samples where Pb was detected in soil	9126
SSL, DAF=1	137
SSL, DAF=4.5	616
SSL, DAF=42.9	5872

min/max soil concentration, mg/Kg	5.15 / 12100
min/max liquid concentration, mg/L	0.012 U / 0.191

Location		E054SB048		E054SB048		E054SB049		E054SB049	
Sample Number		054SB04801		054SB04802		054SB04901		054SB04902	
		(surface)		(subsurface)		(surface)		(subsurface)	
Initial Soil Concentration	mg/kg	0.214	J	0.684	J	0.635	J	0.189	J
SPLP Water Concentration	mg/L	0.0004	UJ	0.0004	UJ	0.0004	UJ	0.0004	UJ
Soil mass	kg	0.1		0.1		0.1		0.1	
Water volume	L	2		2		2		2	
Total contaminant mass in soil	mg	0.0214		0.0684		0.0635		0.0189	
Total contaminant mass in water	mg	0.0004		0.0004		0.0004		0.0004	
Adjusted soil concentration	mg/kg	0.2		0.68		0.631		0.185	
Kd	L/kg	1050		3400		3155		925	

For DAF = 1, SSL = Kd x MCL

		Individual SSL, mg/kg			
DAF =	1	2	7	6	2
DAF =	4.5	9	31	28	8
DAF =	42.9	90	292	271	79

MCL, mg/L 0.002

SSL = Kd x MCL x DAF

geometric mean of Kd in samples where Hg was detected in soil 1414
SSL, DAF=1 3
SSL, DAF=4.5 13
SSL, DAF=42.9 121

min/max soil concentration, mg/Kg 0.02 U / 0.684
min/max liquid concentration, mg/L 0.0004 U / 0.0004 U

mercury

Location		E054SB050		E054SB050		E054SB051		E054SB051	
Sample Number		054SB05001 (surface)		054SB05002 (subsurface)		054SB05101 (surface)		054SB05102 (subsurface)	
Initial Soil Concentration	mg/kg	0.174	J	0.02	U	0.369	J	0.024	U
SPLP Water Concentration	mg/L	0.0004	UJ	0.0004	UJ	0.0004	UJ	0.0004	UJ
Soil mass	kg	0.1		0.1		0.1		0.1	
Water volume	L	2		2		2		2	
Total contaminant mass in soil	mg	0.0174		0.001		0.01845		0.0024	
Total contaminant mass in water	mg	0.0004		0.0004		0.0004		0.0008	
Adjusted soil concentration	mg/kg	0.17		0.006		0.1805		0.016	
Kd	L/kg	850		30		903		80	

For DAF = 1, SSL = Kd x MCL

			Individual SSL, mg/kg			
	DAF =	1	2	0.06	1.81	0.16
	DAF =	4.5	8	0.27	8.12	0.72
	DAF =	42.9	73	3	77	7

MCL, mg/L 0.002

SSL = Kd x MCL x DAF

geometric mean of Kd in samples where Hg was detected in soil	**1414**
SSL, DAF=1	3
SSL, DAF=4.5	13
SSL, DAF=42.9	121

min/max soil concentration, mg/Kg	0.02 U / 0.684
min/max liquid concentration, mg/L	0.0004 U / 0.0004 U

Location		E054SB048		E054SB048		E054SB049		E054SB049	
Sample Number		054SB04801 (surface)		054SB04802 (subsurface)		054SB04901 (surface)		054SB04902 (subsurface)	
Initial Soil Concentration	mg/kg	0.559	U	6.2	U	1.2	U	0.595	U
SPLP Water Concentration	mg/L	0.05	U	0.05	U	0.06	U	0.05	U
Soil mass	kg	0.1		0.1		0.1		0.1	
Water volume	L	2		2		2		2	
Total contaminant mass in soil	mg	0.02795		0.31		0.06		0.02975	
Total contaminant mass in water	mg	0.05		0.05		0.06		0.05	
Adjusted soil concentration	mg/kg	-0.2		2.6		0		-0.2025	
Kd	L/kg	-4		52		0		-4	

For DAF = 1, SSL = Kd x MCL

		Individual SSL, mg/kg			
DAF =	1	-0.07	0.78	0.00	-0.06
DAF =	4.5	-0.30	3.51	0.00	-0.27
DAF =	42.9	-2.84	33.46	0.00	-2.61

MCL, mg/L 0.015

SSL = Kd x MCL x DAF

geometric mean of Kd in samples where Tl was detected in soil	Thallium not detected in soil samples
SSL, DAF=1	NA
SSL, DAF=4.5	NA
SSL, DAF=42.9	NA
min/max soil concentration, mg/Kg	0.55 U / 6.2 U
min/max liquid concentration, mg/L	0.05 U / 0.06 U

thallium

Location		E054SB050		E054SB050		E054SB051		E054SB051	
Sample Number		054SB05001 (surface)		054SB05002 (subsurface)		054SB05101 (surface)		054SB05102 (subsurface)	
Initial Soil Concentration	mg/kg	0.55	U	0.603	U	0.604	U	0.569	U
SPLP Water Concentration	mg/L	0.05	U	0.05	U	0.05	U	0.05	U
Soil mass	kg	0.1		0.1		0.1		0.1	
Water volume	L	2		2		2		2	
Total contaminant mass in soil	mg	0.0275		0.03015		0.0302		0.0569	
Total contaminant mass in water	mg	0.05		0.05		0.05		0.1	
Adjusted soil concentration	mg/kg	-0.225		-0.1985		-0.198		-0.431	
Kd	L/kg	-5		-4		-4		-9	

For DAF = 1, SSL = Kd x MCL

		Individual SSL, mg/kg			
DAF =	1	-0.07	-0.06	-0.06	0
DAF =	4.5	-0.30	-0.27	-0.27	-1
DAF =	42.9	-2.90	-2.55	-2.55	-6

MCL, mg/L 0.015

SSL = Kd x MCL x DAF

geometric mean of Kd in samples where Tl was detected in soil	Thallium not detec
SSL, DAF=1	NA
SSL, DAF=4.5	NA
SSL, DAF=42.9	NA
min/max soil concentration, mg/Kg	0.55 U / 6.2 U
min/max liquid concentration, mg/L	0.05 U / 0.06 U

APPENDIX D
SPLP Analytical Results
SWMUs 21 and 54, Zone E, CNC

Chemical	Station ID	Sample ID	Date Collected	Soil Concentration (mg/Kg)	Qualifier	Leachate Concentration (mg/L)	Qualifier
Surface Soil							
Antimony	E054SB048	054SB04801	09/16/02	2.07	J	0.048	U
	E054SB049	054SB04901	09/16/02	4.47	J	0.048	U
	E054SB050	054SB05001	09/16/02	0.529	UJ	0.048	U
	E054SB051	054SB05101	09/16/02	0.58	UJ	0.048	U
Lead	E054SB048	054SB04801	09/16/02	365	=	0.012	U
	E054SB049	054SB04901	09/16/02	822	=	0.144	J
	E054SB050	054SB05001	09/16/02	75.6	=	0.012	U
	E054SB051	054SB05101	09/16/02	110	=	0.012	U
Mercury	E054SB048	054SB04801	09/16/02	0.214	J	0.0004	UJ
	E054SB049	054SB04901	09/16/02	0.635	J	0.0004	UJ
	E054SB050	054SB05001	09/16/02	0.174	J	0.0004	UJ
	E054SB051	054SB05101	09/16/02	0.369	J	0.0004	UJ
Thallium	E054SB048	054SB04801	09/16/02	0.559	U	0.05	U
	E054SB049	054SB04901	09/16/02	1.2	U	0.06	U
	E054SB050	054SB05001	09/16/02	0.55	U	0.05	U
	E054SB051	054SB05101	09/16/02	0.604	U	0.05	U
Subsurface Soil							
Antimony	E054SB048	054SB04802	09/16/02	532	J	0.048	U
	E054SB049	054SB04902	09/16/02	0.837	J	0.048	U
	E054SB050	054SB05002	09/16/02	0.579	UJ	0.048	U
	E054SB051	054SB05102	09/16/02	0.547	UJ	0.048	U
Lead	E054SB048	054SB04802	09/16/02	12100	=	0.012	U
	E054SB049	054SB04902	09/16/02	365	=	0.191	J
	E054SB050	054SB05002	09/16/02	5.15	=	0.012	U
	E054SB051	054SB05102	09/16/02	8.77	=	0.042	J
Mercury	E054SB048	054SB04802	09/16/02	0.684	J	0.0004	UJ
	E054SB049	054SB04902	09/16/02	0.189	J	0.0004	UJ
	E054SB050	054SB05002	09/16/02	0.02	U	0.0004	UJ
	E054SB051	054SB05102	09/16/02	0.024	U	0.0004	UJ
Thallium	E054SB048	054SB04802	09/16/02	6.2	U	0.05	U
	E054SB049	054SB04902	09/16/02	0.595	U	0.05	U
	E054SB050	054SB05002	09/16/02	0.603	U	0.05	U
	E054SB051	054SB05102	09/16/02	0.569	U	0.05	U

U indicates that the compound was not detected. The reported value is the reporting limit.
UJ indicates that the compound was not detected. The reported value is an estimated reporting limit.
J indicates that the compound was detected and the reported value is an estimated concentration.
= indicates that the reported value is the measured concentration.

Appendix E

PROJECT NUMBER	WELL NUMBER	
158814.ZE	E021GW001	SHEET 1 OF 1

CH2MHILL

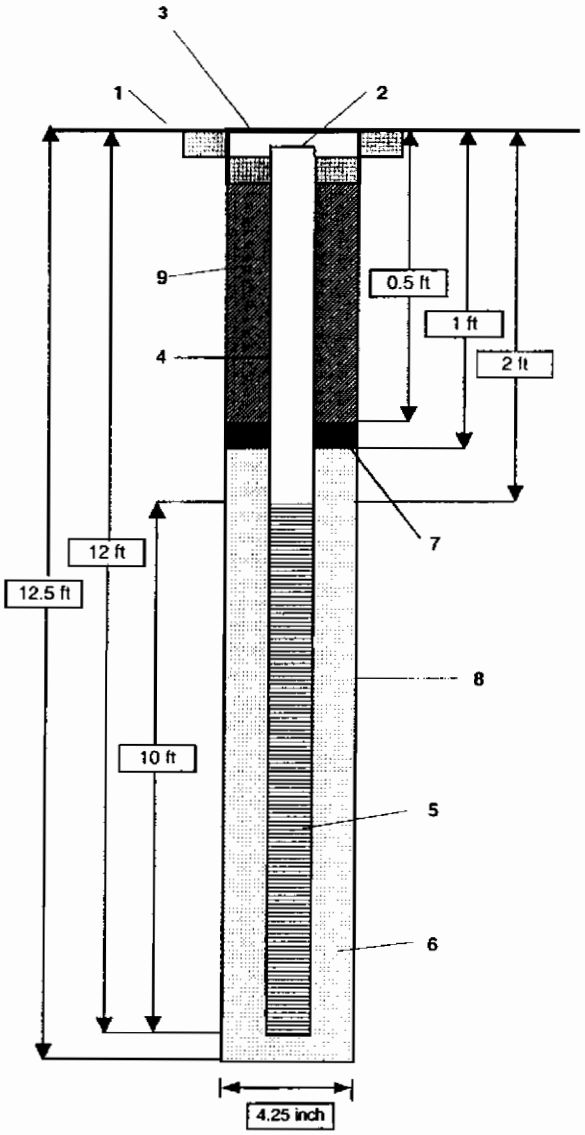
WELL COMPLETION DIAGRAM

PROJECT : SWMU 21, Zone E, Charleston Naval Complex — LOCATION : Charleston, South Carolina

DRILLING CONTRACTOR : Prosonic Corporation License # 1435 — NORTHING 377657

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Augering (4.25-inch diameter) — EASTING: 2317708

WATER LEVELS : not measured — START : 9/18/2002 — END: 9/18/2002 — LOGGER : D. Gates/NVR



1- Ground elevation at well	not measured
2- Top of casing elevation	9.28'
3- Protective cover type	above ground steel protective casing
a) concrete pad dimensions	
4- Dia./type of well casing	2-inch inside diameter schedule 40 PVC
5- Type/slot size of screen	0.010-inch dia. machine slotted PVC
6- Type filter pack	20/30 Sieve Size Silica Sand (5 bags)
7- Type of seal	3/8-inch bentonite chips, Baroid
8- Borehole diameter	4.25"
9- Grout	Type I Portland Cement

Note: Diagram not to scale.

CH2MHILL

PROJECT NUMBER	DPT NUMBER	
158814.ZE	E021GW001	page 1 of 1

DPT SOIL SAMPLE LOG

PROJECT : Charleston Naval Complex (AOC 701) **LOCATION :** Charleston, SC **NORTHING:** 377657

ELEVATION : not measured **DRILLING CONTRACTOR :** Prosonic License # 1435 **EASTING:** 2317708

DRILLING METHOD AND EQUIPMENT USED : Direct-Push Sampling, 4 - ft screen

START : 9/18/2002 **END:** 9/18/2002 **LOGGER :** D. Gates/NVR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS TESTS, INSTRUMENTATION ABANDONMENT METHOD
	0-2.5'	surface: weeds, dirt **SAND**: dark brown, fine-medium grained, moist, soft	
5 10	2.5-13'	**CLAY**: silty, sandy, saturated, soft	Boring ended at 13'
15 20 25 30			

PROJECT NUMBER	WELL NUMBER	
158814.ZE	E021GW002	SHEET 1 OF 1

CH2MHILL

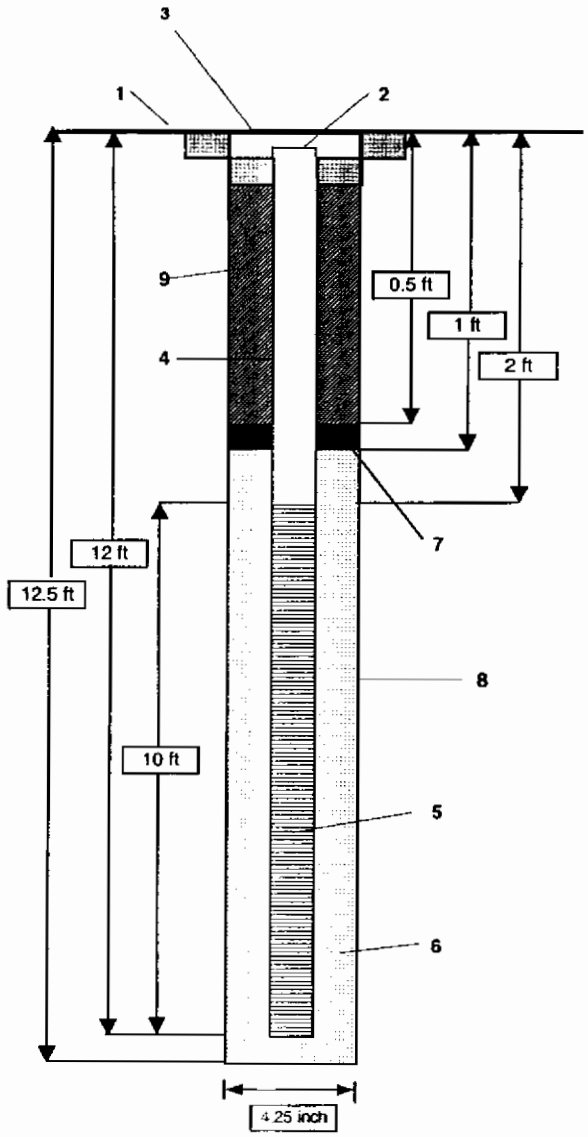
WELL COMPLETION DIAGRAM

PROJECT : SWMU 21, Zone E, Charleston Naval Complex — LOCATION : Charleston, South Carolina

DRILLING CONTRACTOR : Prosonic Corporation License # 1435 — NORTHING 377728

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Augering (4.25-inch diameter) — EASTING: 2317683

WATER LEVELS : not measured — START : 9/18/2002 — END: 9/18/2002 — LOGGER : D. Gates/NVR



1- Ground elevation at well	not measured
2- Top of casing elevation	12.01'
3- Protective cover type	above ground steel protective casing
a) concrete pad dimensions	
4- Dia./type of well casing	2-inch inside diameter schedule 40 PVC
5- Type/slot size of screen	0.010-inch dia. machine slotted PVC
6- Type filter pack	20/30 Sieve Size Silica Sand (5 bags)
7- Type of seal	3/8-inch bentonite chips, Baroid
8- Borehole diameter	4.25"
9- Grout	Type I Portland Cement

Note: Diagram not to scale.

CH2MHILL

PROJECT NUMBER	DPT NUMBER	
158814.ZE	E021GW002	page 1 of 1

DPT SOIL SAMPLE LOG

PROJECT : Charleston Naval Complex (AOC 701) **LOCATION :** Charleston, SC **NORTHING:** 377728

ELEVATION : not measured **DRILLING CONTRACTOR :** Prosonic License # 1435 **EASTING:** 2317683

DRILLING METHOD AND EQUIPMENT USED : Direct-Push Sampling, 4 - ft screen

START : 9/18/2002 **END:** 9/18/2002 **LOGGER :** D. Gates/NVR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS TESTS, INSTRUMENTATION ABANDONMENT METHOD
		surface: weeds, dirt	
	0-3.5'	**SAND**: dark brown, fine-medium grained, moist	
	3.5-5'	**SANDY CLAY**, fine grained, moist to wet	
5			
	5-13'	**SAND:** black, clayey to silty, saturated	
10			
			Boring ended at 13'
15			
20			
25			
30			

Appendix F

Responses To Comments from Eric F. Cathcart — SCDHEC
for Draft Zone E RCRA Facility Investigation Report
Charleston Naval Complex

Site-Specific Comments

SWMU 21/54
Comment 5
Page 10.2-50 The report states that "combined SWMU 21 monitoring wells are no longer usable following interim measures removal actions." Have replacement wells been installed to date? If so, the Navy should update the site map with the new well locations. If replacement wells have not been installed, the Navy should inform the Department of plans for monitoring the site.

Response 5
Prior to the interim action, metals detections in groundwater were sporadic and generally less than MCLs. These wells were not replaced after the detachment conducted the soil removal, because the source of contamination was eliminated. Discussions are ongoing pertaining to the widespread presence of inorganics in groundwater and how to interpret the significance of that data. A technical memo was submitted to the Project Team to review several months ago and it was briefly discussed at a meeting with SCDHEC in June. At that meeting SCDHEC indicated their review of the memo was not complete and that further discussion should be deferred until that review was complete. There are no plans to re-install monitoring wells at this site.

Comment 6
Section 10.2.9, Page 10.2-84, Line 17: The text states "corrective measures from may be appropriate." It appears that a word or words are missing from the text; therefore the statement should be revised.

Response 6
An editorial change will be made and the word "from" will be eliminated from the text.

Responses To Comments from Dynamac/Gannett Fleming
for Draft Zone E RCRA Facility Investigation Report
Charleston Naval Complex

SWMUs 21 and 54
Comment 1
Table 10.2.8.1, Page 10.2-55: The definition of the double asterisk ("identified as an industrial COPC") should be added as a note to the table.

Response 1
A footnote will be added to the table.

Comment 2
Section 11.2,, Page 11-8, Line 2: The text states that SWMU 21 consists of a 20 by 80-foot concrete pad. The site consists of a 20 by 180-foot concrete pad, according to Section 10.2 (page 10.2-1). The text in Section 11.2 should be corrected.

Response 2
The text will be revised to reflect this correction.

Appendix G

-740-2785

WASTE MANAGEMENT

OAKRIDGE LANDFILL
2183 Highway 78, Dorchester, SC 29437
Tel 843-563-2607 Fax 843-563-3175

SPECIAL WASTE MANIFEST
APPROVAL # OR 0204001
EXPIRATION 04/01/2003

WASTE ID #'S FVOL-70 (Southern Division Naval Facility)

Generator: PEPPERHILL PROCESSING TSF FACILITY

Account Number: 490-148

Location / Address: 141 FENNELL RD N CHARLESTON SC 29418

Tele Number: 843-552-8306 **Contact:** JENNIFER CRIM

Generator Signature:

********** TO BE COMPLETED BY TRANSPORTER **********

Transporter of Waste: FENN VAC **Truck #** 382

Date: 3-4-03 **Driver Signature:**

********** TO BE COMPLETED BY OAKRIDGE LANDFILL **********

Disposal Site: Oakridge Landfill DWP 130

Description of Waste: SLD/NON REGULATED SLUDGE (SOLIDFIED)

Ticket Number: 220473 **Tonnage:** 12.43

Received by: W Williams **Date:** 3-4-03

WASTE MANAGEMENT

OAKRIDGE LANDFILL
2183 Highway 78, Dorchester, SC 29437
Tel 843-563-2607 Fax 843-563-3376

SPECIAL WASTE MANIFEST
APPROVAL # OR 0204001
EXPIRATION 04/01/2003

WASTE ID #'S SV01-70 (Southern Division Naval facility)

Generator: **PEPPERHILL PROCESSING TSF FACILITY**

Account Number: **490-148**

Location / Address: **141 FENNELL RD** **N CHARLESTON SC 29418**

Tele Number: **843-552-8306** **Contact: JENNIFER CRIM**

Generator Signature: [signature]

********** TO BE COMPLETED BY TRANSPORTER **********

Transporter of Waste: FENN VAC Truck # 382

Date: 3-4-03 Driver Signature: [signature]

********** TO BE COMPLETED BY OAKRIDGE LANDFILL **********

Disposal Site: **Oakridge Landfill DWP 130**

Description of Waste: **SLD/NON REGULATED SLUDGE (SOLIDIFIED)**

Ticket Number: 220505 **Tonnage:** 10.55

Received by: [signature] **Date:** 3-4-03

WASTE MANAGEMENT

OAKRIDGE LANDFILL
2183 Highway 78, Dorchester, SC 29437
Tel 843-563-7607 Fax 843-563-3375

SPECIAL WASTE MANIFEST
APPROVAL # OR 0204001
EXPIRATION 04/01/2003

WASTE ID #'S SV01-70 (Southern Division Naval Facility)

Generator: **PEPPERHILL PROCESSING TSF FACILITY**

Account Number: **490-148**

Location / Address: **141 FENNELL RD** **N CHARLESTON SC 29418**

Tele Number: **843-552-8306** **Contact: JENNIFER CRIM**

Generator Signature: [signature]

********** TO BE COMPLETED BY TRANSPORTER **********

Transporter of Waste: FENN VAC Truck # 382

Date: 3-4-03 Driver Signature: [signature]

********** TO BE COMPLETED BY OAKRIDGE LANDFILL **********

Disposal Site: **Oakridge Landfill DWP 130**

Description of Waste: **SLD/NON REGULATED SLUDGE (SOLIDFIED)**

Ticket Number: 220550 **Tonnage:** 11.46

Received by: W. Williams **Date:** 3-4-03

Appendix H

Photo 1 – Excavation area prior excavation activities.

Photo 2 – Excavation activities in progress.

Photo 3 – Excavation and site rehabilitation complete.

Appendix I

CH2MHILL TRANSMITTAL

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

From: Jim Edens/CH2M-Jones
(352) 335-5877 ext. 2491

Date: July 9, 2003

Re: CH2M-Jones' Responses to Comments by SCDHEC regarding the *RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Revision 0*

Quantity	Description
4	CH2M-Jones' Responses to Comments by SCDHEC regarding the *RFI Report Addendum/IM Completion Report/CMS Work Plan, SWMUs 21 and 54, Zone E, Revision 0* – Originally Submitted on May 9, 2003

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

Remarks:

Copy To:

Dann Spariosu/USEPA, w/att
Rob Harrell/Navy, w/att
Gary Foster/CH2M-Jones, w/att

Comments Prepared by Mansour Malik:

1. Comment 1
   Section 5.5.3 Lead: Lead was detected at a concentration of 258 :g/L (unfiltered sample) in shallow groundwater at monitoring well E054GW002. In the filtered sample no lead was detected. The text attributed the lead detection to the high content of suspended solids but no turbidity values were recorded. The Division of Hydrogeology agrees with the recommendation for additional sampling during the CMS phase. Both unfiltered and filtered samples should be collected and turbidity must be recorded. Note that according to the drinking water standards, the action level for lead (total) is 15 :g/L.

   CH2M-Jones Response:
   Comment noted. To remain consistent with current practices, turbidity measurements will be made during future groundwater sampling at the site. Turbidity measurements were made during the September 2003 sampling effort. The field team noted that although the water sample (054GW002M2) appeared clear, the turbidity reading varied between 52.6 (final) to 211 (initial) nephelometric turbidity units (NTUs). Below are the turbidity readings for the September 2003 groundwater sampling event:

TABLE 1
Turbidity Measurements From the September 2003 Sampling Event
SWMU 21 and 54, Zone E, Charleston Naval Complex

Station	Initial Turbidity (NTU)	Final Turbidity (NTU)
E021GW001	126	0.0
E021GW002	68.5	12.7
E054GW002	211	52.6 *

Notes: * Turbidity in the groundwater sample measured 52.6 nephelometric turbidity units (NTUs) (min) although water appeared clear.

2. Table 5-3, page 5-43
   Lead values entered at the top of the page appear to be meant for nickel. Please revise table or clarify these values.

   CH2M-Jones Response:
   Your observation is correct. The results are a continuation of the nickel results from the previous page. A replacement for page 5-43 is attached.

3. Section 9.6 CMS Report
   Table 9-1 referenced in this section as providing an example of the report format and content organization, is missing. Please include the missing table.

CH2M-Jones Response:
The missing table is attached for inclusion at the end of Section 9.0.

4. Table 2-1
Please include the acronym "TBD" in the "Acronyms and Abbreviations" list.

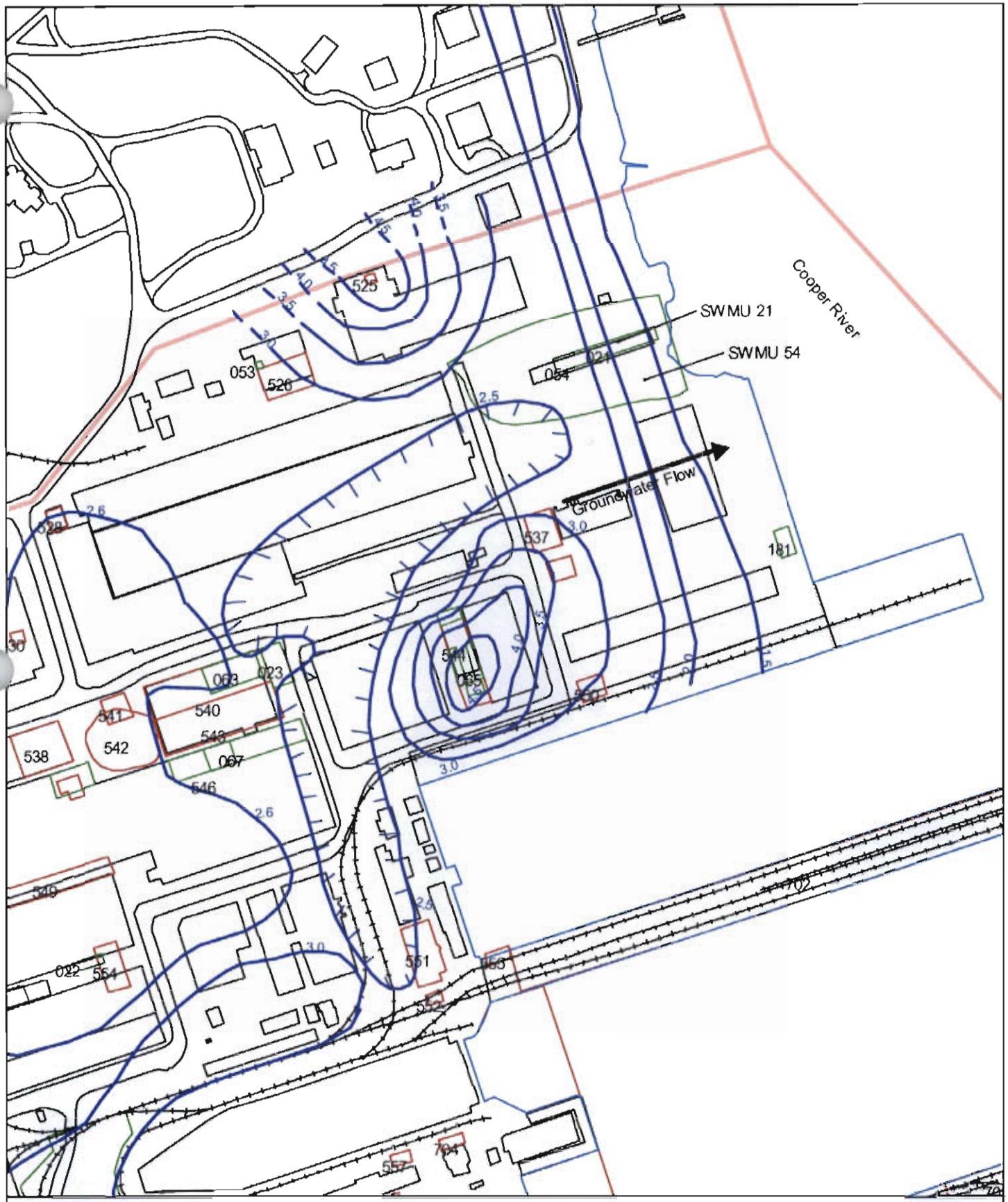
CH2M-Jones Response:
The submission date for the RFI Report Addendum was not determined during much of the development of the document. "TBD" was included in Table 2-1 to indicate that the report submission date was "to be determined." Prior to the actual submission of the report, "TBD" should have been replaced with the document date (May 2003).

Attached are replacement pages for Table 2-1, which do not contain the acronym "TBD." The acronym "TBD" was not added to the "Acronyms and Abbreviations" list since it was deleted from the document.

5. Comment 5
In an earlier decision the BCT agreed that RFI Reports should include potentiometric maps detailing the site hydrogeological settings and indicating the groundwater flow. The Zone E RFI didn't contain that information. The fact that four monitoring wells had been damaged and only two were replaced also requires revision of the groundwater monitoring system. The EGIS does not present a site- specific groundwater flow map. A site potentiometric map should be included in this document. The flow direction will also determine which monitoring wells should be selected for future groundwater monitoring. The Navy should propose to monitor E054GW002 and identify appropriate monitoring to locations dependent on groundwater flow direction.

CH2M-Jones Response:
A potentiometric contour map of shallow groundwater elevations was presented in the Sampling and Analysis Plan for SWMUs 21 and 54, which was submitted by CH2M-Jones on August 20, 2002.

It included a discussion of groundwater flow and the relationship between groundwater flow and the locations of site monitoring wells. This information was not included in the RFI Report Addendum for SWMUs 21 and 54. Therefore, the text in Section 4.0 has been changed to include a reference to the groundwater contour map, and a potentiometric contour map has been added to the end of Section 4.0 as Figure 4-2. The revised pages are attached, and should be inserted in Section 4.0.



Known Shallow Groundwater Contour (5/14/02)
Inferred Shallow Groundwater Contour (5/14/02)
Fence
Railroads
Roads
Groundwater Well
AOC Boundary
SWMU Boundary
Buildings
Zone Boundary

N

0 200 400 Feet

Figure 4-2
Shallow Groundwater Contours
SWMU 21 and SWMU 54, Zone E
Charleston Naval Complex

CH2MHILL

File Path: C:\18gis\Projects\Zone_E\ZoneE_GW\zonee_gw_figs.apr, Date: 04 Jul 2003 10:03, User: NMOUDRY, Figure 4-2 SWMU 21 and 54